# ELECTRICAL REVIEW

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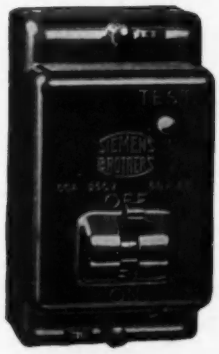


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ELECTRICAL REVIEW

1 May 1959 Vol. 164 No. 18 Established 1872

# *Inadequate Servicing Manuals*

DURING the course of each year we receive many catalogues, brochures and other publications from manufacturers in the electrical industry. Almost without exception these publications are of a very high standard; they are well written, well illustrated and set out in a generally helpful manner. It is a great pity, therefore, that this same universally high standard of information is adopted by only a comparatively small number of manufacturers in connection with operating instruction manuals and servicing instructions. These are particularly important, if not vital, in the instrument field. The subject was raised by us in our leading article of 26th September last and as a result received considerable attention at the Harrogate Convention of the Scientific Instrument Manufacturers' Association (SIMA) a few months ago.

Perhaps the problem is not so important in this country where the user can get in touch with the manufacturer quickly by telephone but if he has to do this frequently he will, quite naturally, consider placing future orders for equipment elsewhere. It becomes more serious in the export field because the products of a particular nation can get a very bad name if one or two firms fail to provide adequate servicing instructions with their equipment. Even the best-made instruments can go wrong or become damaged in some way and, if the overseas user does not find the requisite information readily to hand, he will shelve the instrument, forming a poor opinion of the manufacturer and possibly deciding to buy elsewhere on future occasions. This state of affairs actually exists and in one country, at any rate, British instruments are making little headway for these very reasons.

When a manufacturer sells an instrument it is his duty to ensure that should the instrument fail it should be available for use again with the least possible delay. In this country many manufacturers have service engineers who can quickly be summoned to a works to put matters right. There are also a number of instrument servicing companies who will deal with any make of instrument. In the main these specialised companies work within one particular industry such as the textile industry, to quote one example, where they are familiar with the conditions of service, possibly more so than the manufacturer of the instrument.

In the export field things are rather different and the user of an instrument will in most cases have to repair it himself. It is vital for him to have

full details of the circuit arrangement and component values. All too often an instrument is supplied with a circuit printed on a comparatively small sheet of paper which can easily become separated from the instrument. Alternatively, it may be incorporated in the instruction manual; but here again component values are not often quoted and the book can easily be lost. At the SIMA Convention several users put forward an idea which is employed by the more enterprising manufacturers: that is to have the circuit diagram and component values engraved on a plastic panel firmly attached to the instrument.

On the question of instruction and servicing manuals we feel that it would repay manufacturers to spend a little more time and money ensuring that these publication do their job. Instruction and servicing manuals should be clearly and concisely written, preferably by a technical writer and not by the designer of the equipment. This is no reflection on the designer but since he already understands the equipment he is unlikely to write instructions which can easily be understood by a less well-informed individual.

## DIPLOMAS IN TECHNOLOGY

According to the second report of the National Council for Technological Awards, which was published last week, the number of students taking advanced courses leading to the award of the new Diploma in Technology has increased more than two-and-a-half times during the past eighteen months. Over 2,500 students are now following 66 courses leading to the Diploma at 20 colleges, as compared with 965 students following 37 courses at 11 colleges in November, 1957. Since the Council was set up just over three years ago the first Diplomas in Technology have been awarded and before long several hundred holders will be taking their place in industry each year. The technical colleges and supporting industrial organisations are to be congratulated. An indication of the support which industry is giving can be gained from the fact that 82 per cent of students following sandwich courses for the Diploma in Technology have their fees paid by their employers.

The report shows that colleges are active in developing liberal studies in a wide variety of ways. Many colleges now provide a basic course in English and social studies leading to an introductory study of industrial administration. All schemes give particular emphasis to written and spoken English and a considerable number to English literature as well. Last November the Council outlined its plans for an award higher than the Diploma in Technology which would lead to admission to membership of a College of Technologists. This scheme is now well advanced and details are expected to be available shortly.

## FUSE TESTS

An ASTA certificate of short-circuit rating is issued only when the fuse tested complies in all respects with the appropriate clauses of a recognised British Standard Specification. When the fuse does not comply with such a specification, or if no appropriate specification exists, a report of performance only is issued. As exemplified by a court case in September, 1957, B.S. 88 is capable of misinterpretation, and so ASTA 20 has been published which lays down rules governing short-circuit testing and certification of low and medium a.c. voltage fuses.

Very careful attention has been paid to the sections on identification of fuses and assessment of test results. In the section covering the range of application of ASTA certificates, it is stipulated that there must be no essential differences in the design of a fuse from the one tested and the fuse elements must be contained in the same size and length of barrel. The new rules will undoubtedly help in maintaining a high standard of product and ensuring safety.

## ENFORCEMENT OF CONDITIONS

During the war it was decreed that in any industry in which terms and conditions of employment had been settled by representative organisations of employers and trade unions such terms and conditions of employment should be observed by all employers in that industry. This principle was acted upon by the Industrial Disputes Tribunal (now no more) in a number of its decisions.

In fact, one of its last awards (reported on page 825 of this issue) was based on the principle that recognised terms and conditions in the electrical contracting industry (in this case relating to the registration of an apprentice) must be observed by employers whether or not they were members of the National Federated Electrical Association—the electrical contractors' organisation for negotiating terms and conditions of employment.

Now that the Tribunal has ceased to function, this compulsion presumably ends too, but it is still desirable that negotiated agreements should operate throughout an industry. The issue under notice was brought to the Tribunal by the Electrical Trades Union. It looks as though it may be left to the unions to enforce the observance of conditions in future, however unsatisfactory that may be deemed.

## AERO-ENGINE ALTERNATOR DRIVE

The Bristol Siddeley "Proteus" aero engine, as used in the Bristol "Britannia" airliner, has been modified to operate on diesel oil for use in fast naval patrol boats. This modified version has now been adapted to drive a 3 MW alternator and the South Western Electricity Board has ordered two of these sets for use in remote areas. The advantages of these compact, self-contained, lightweight units include remote control and no cooling water requirements. For peak load generation, maximum power is available in cold weather because of the compressor characteristics and there is no need to run the engine at less than maximum power to obtain reliable or economic operation.

In the event of overload, the capacity of the free turbine engine to provide a higher torque at lower speed provides a useful measure of automatic load shedding without stalling. Automatic synchronising is facilitated since the alternator is connected to a unit of low inertia. The overall efficiency is only about 22 per cent but this is of secondary importance compared to the advantages of the equipment as standby plant. A description appears on page 811.

# Heavy Plant Manufacture

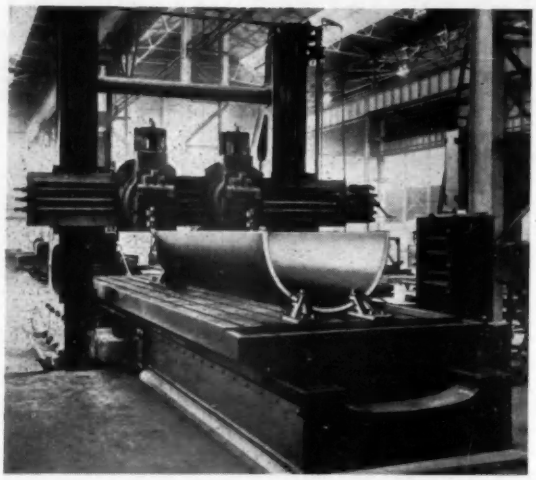
**The heavy plant manufacturing facilities of International Combustion, Ltd., have recently been extended to take account of future developments both in conventional and nuclear power plant. This new heavy engineering shop was officially opened last week by Lord Mills. The shop has a total floor area of 68,250 sq ft and was built in the short time of only nine months**

ON Friday last a new heavy engineering shop was officially opened at the Derby works of International Combustion, Ltd., by Lord Mills, Minister of Power. Throughout its history this company has played a leading part in the development of steam raising plant for power stations. Significant orders in hand at present include the 550 MW reheat boiler for the Thorpe Marsh power station of the Central Electricity Generating Board, five 120 MW reheat units for Buenos Aires and two 200 MW units for the Electricity Commission of New South Wales for the Vales Point station.

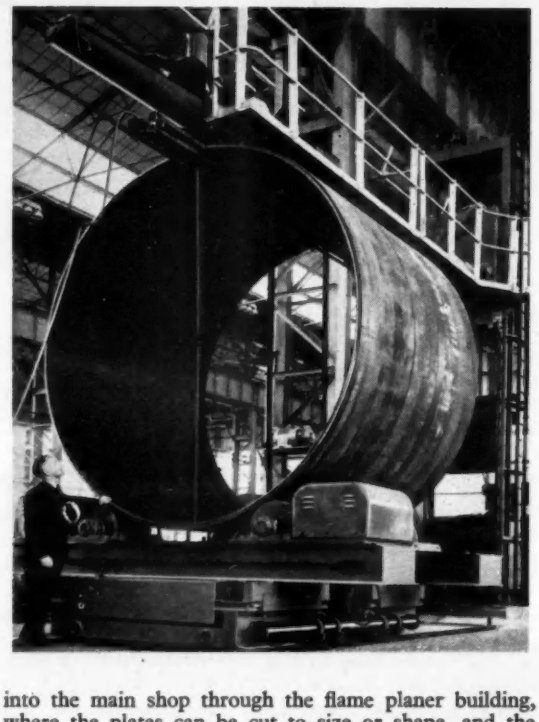
To provide for the future, the company decided to extend its manufacturing facilities, having in mind both future development in conventional power plant and its obligation to Atomic Power Constructions, Ltd., the group company in which it is principal shareholder.

In addition to the new heavy engineering shop and the clean conditions building, extensions have been made to the laboratory departments, together with a rationalisation and extension of the research facilities. These extensions will substantially increase the overall manufacturing facilities of the company, and should prove to have a significant effect on the economy of the country as well, because in recent years a number of pressure

*Interior view of the new heavy engineering shop*



Above: The general purpose planer



Right: The boom welder

vessels have had to be purchased from abroad, due to lack of manufacturing capacity in Great Britain.

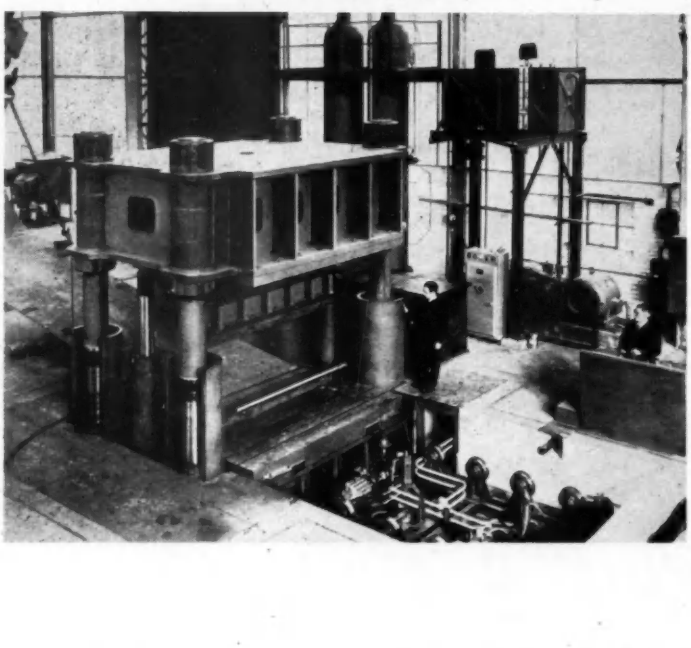
The heavy engineering shop has been designed so that pressure vessels for conventional and nuclear power stations and for the chemical, the refinery and similar industries can all be manufactured with equal ease. Work on the foundations of this 68,250 sq ft shop began in January, 1958, and the building was completed last September. It is built upon concrete piles and the height from the floor of the shop to the crane rails is 40ft. The overall length of the shop is 350ft and there are three bays, the centre one being 75ft and each wing 65ft wide. An unusual feature of the building is the thermal insulation provided by double panelling of the window glazing, the wall panelling, and the roof covering.

The layout of the machinery around the shop perimeter is suited to the progressive stages of manufacture, each bay being served by two cranes, the heaviest of which is of 50 tons lifting capacity.

Raw material taken from the stock yard is transferred into the main shop through the flame planer building, where the plates can be cut to size or shape, and the initial weld preparations formed on the plate edges. Further edge preparation for welding is carried out on either a large planer accommodating plates up to 35ft long, or on a standard planer which has a table 25ft long. Circumferential weld preparation can be done on a large centre lathe, or on a vertical boring machine.

Two vertical presses, each of 3,000 tons capacity, can together handle a range of plate bending in various widths from 3in thick (cold) at a minimum diameter of 3ft, up to 4in thick (cold) at 25ft diameter. A four-column downstroking press of 2,000 tons capacity provides for the hot pressing of dished ends and segments for all diameters of vessels and drums. Lighter sections of plate up to 1½ thick can be manipulated in the power rolls.

The 2,000 ton flanging press



The principal welding machine is an automatic welder with a rising boom catering for vessels up to 12½ft diameter, and 50ft long. These vessels can be manipulated under the welding head by means of a roller bed installation. A number of other welding facilities of the self-propelled automatic type are used together with such standard d.c. and a.c. sets as are required for the work in progress.

To allow additional headroom for the construction of very large diameter vessels, the centre bay contains a welding pit 150ft long by 25ft wide by 12ft deep. The floor of the pit carries manipulating equipment for rotating vessel sections during seam welding, and also provides adequately screened space for X-ray examination.

A group of three furnaces, centralised

at the south end of the shop, handles the heating of plates for dishing and the heat treatment of either large or medium diameter vessels, or of large diameter sections of vessels. They are all gas fired and have fully automatic control for temperature regulation and the process is recorded throughout.

The large vertical borer can be adjusted to take work up to 25ft in diameter and is used for cylindrical edge preparation, general boring and facing. There is also a floor boring machine with a 3in diameter spindle. Tube hole drilling, and profiling tube stubs for welding, is catered for by a duplex horizontal boring machine. Further drilling machines for angular boring, facing and plate drilling are also installed.

A clean conditions building, which is entirely separate but complementary to the heavy engineering shop, has been erected on its east side. Here the final assembly of heat exchangers and other similar vessels for nuclear work is undertaken in booths which are completely isolated and fully air conditioned. The finished work can be assembled in conditions of absolute cleanliness, prior to being sealed in readiness for dispatch.

# Maintenance of Electronic Equipment

MANUFACTURERS of electronic equipment in the process industries were criticised at the Institution of Electrical Engineers last week. Mr. J. K. Webb, chairman of the Measurement and Control Section, presided at the discussion on the problems of maintenance, opened by Dr. G. Morris. Dr. Morris said that unreliability in process control was measured by the loss of production, since this cost was usually very much greater than that of repairing the control device. In a single machine, the cost of a breakdown might be proportional to the time the machine was off-process, but with modern flow methods the breakdown of one machine might shut down the whole plant. Shut-down time could be minimised by dividing the instrument into sub-sections and providing rapid means of diagnosis and ample plug-in spare parts.

Improved reliability could be achieved by careful design, the choice of the correct parameter to measure, sound electronic design, good selection of components, and, above all, sound mechanical design. Mechanical design should always take account of ease of servicing. Routine maintenance was of importance but its application to electronics was not easy. There was evidence that periodic overhauls could produce faults which had to be eliminated in use following servicing. The process industries called for much longer times between breakdowns than, for example, military applications. At least 10,000 hours' continuous service should be the aim in electronic devices used in process control.

Dr. Morris was followed by Mr. N. T. C. McAffer who pointed out that the quality of service given by equipment was affected by various fundamental factors such as operation function, performance specification, design procedures, manufacturing techniques and user attitudes. Proper collaboration between producer and user could do much to eliminate the difficulties arising from the first four of these aspects.

Mr. R. J. Redding spoke from experience of the introduction of automatic process control of an electronic nature to the oil and chemical industry as an alternative to pneumatic controls. He suggested that any attempt at testing equipment must involve a disturbance to it, probably an overloading, and he felt it was better to forget the term "preventive maintenance" and to build into the machine routine checking equipment. If the electronic control was suspect, it could be switched to manual control and then carry on whilst an investigation was made.

Often the shelf life of components was commensurate with their use life, and the stock of spares must be kept to a proper proportion. It was unrealistic to require an undertaking that identical spare parts would be available for 25 years. The user industry might think about bringing equipment up to date every ten years.

Mr. Redding thought that plug-in circuits could be overdone—if it was too easy to change, there could arise the idea of doing it "just in case that will put things right" rather than getting to the bottom of the trouble.

Mr. Hampton said that with armed fighting vehicles it had been necessary to adopt many of the points mentioned by the speakers. With about eight years' experience since the war they had found that the electronics industry was really not attuned to maintenance at all. As a result, they were adopting a plan of valve stages rather than complete amplifiers. Mr. Hampton felt that because designers were completely *au fait* with their equipment, they thought those concerned with its maintenance were equally so. A large number of circuits on a printed board was not a good thing. There was also lack of identification on printed boards, which should either be provided by a colour code overprinting or overprinted instructions. Electronic equipment was now being sold for use in industries where the standard of maintenance was very much lower and a great deal of attention to the handbooks and method of instruction was necessary.

### Instrument Tests

Mr. L. Keating (British Petroleum) said they would like the mechanic to go to the equipment with very little knowledge of electronics but with sufficient information given by the manufacturers to do a complete test of the instrument. As a follow-up they would like further information from the manufacturers to know what to replace if the readings obtained were not those in the manufacturers' instructions, because the supply of technical labour was very difficult. He preferred apparatus with a certificate of intrinsic safety rather than flameproof.

Mr. Vincent (Calder Hall) spoke of ways in which manufacturers could help users to overcome the national shortage of trained staff. Units could be designed with built-in test facilities and easily accessible check points. More comprehensive manuals could be provided. Where built-in test facilities were not possible, manufacturers should supply test sets which could be used with the equipment. Mr. Vincent, believing in leaving well alone, advocated routine performance tests and after that breakdown maintenance only. At Calder Hall they "soak tested" equipment by running it in simulated working conditions to enable it to settle down and the valves to get over the high spot on the failure characteristic. Some of the Calder Hall equipment had been

tested in this way for as long as six months, and in operation the failure rate was very low. It had been said that there should be a feed-back of information from users to manufacturers. Such information was provided at Calder Hall, but their experience had been that there was apathy on the part of manufacturers, who seemed interested only if the user had some problems with the equipment.

Mr. Smith, a designer, said that users got the electronic equipment they were prepared to pay for. He was sure that all the reputable manufacturers were interested in hearing of the misdeeds of their equipment; only too often it was difficult to get any information.

Mr. Redding said there was a limit to the equipment which could be intrinsically safe. In the case of process control equipment, surely the control room could be made a safe area, in which case no problem arose. If it was necessary to place equipment in the danger zone the best way was to air purge it; that also preserved the equipment. Dr. Morris replied that air purging was all right provided there was a pressure switch on the main. He would like to see, as in Germany, filled boxes, which would be much more foolproof than air purging.

Mr. Nock (I.C.I.) did not think any user would mind five-year replacement of equipment if the manufacturers provided interchangeability of equipment. He complained of equipment suddenly becoming obsolete, by manufacturers putting in modifications without any indication. Manufacturers were rather loath to receive criticism. Their point was that they had produced so many models which they had to sell, although they might agree with the criticism and the next model might take it into account. They did not take the user sufficiently into their confidence before they made their final production plans.

Mr. Roberts spoke of the B.B.C.'s programme of development of unattended transmitters where redundant equipment was provided. He added that in communications it had become necessary to think in terms of ten years as the period during which the installation would last. At the end of ten years a completely new system, incorporating all modifications found necessary in the use of the old, was provided.

Mr. Trotter (Central Electricity Generating Board) recalled that unreliability in the 1930's had been overcome by the electricity generating body drawing up a code of practice, to which they obtained conformity from manufacturers because they were then the largest users.

Mr. Cartmell (Windscale) mentioned the contamination of electronic equipment. Because of natural convection, etc., the instrument was bound to get slightly contaminated with radioactivity in an atomic establishment and at the present moment there appeared to be no dry way of decontamination. The manufacturer should consider this when concerned with electronic equipment for atomic stations and should try to keep the outside as smooth as possible. Where knobs came out, contamination could possibly get in. He looked forward to printed circuits cheap enough to throw away when contaminated.

## *E.D.A. CONFERENCE*

IN our last issue we published abstracts of the papers read at the annual conference of the British Electrical Development Association. The closing session was held on Friday at the Connaught Rooms, London, the greater part of the time being devoted to a general discussion. The closing address was given by Sir Josiah Eccles, deputy chairman of the Electricity Council.

After pointing out that advances in the efficiency of electricity generation and the economics of co-ordinated distribution had kept electricity price increases to about half the general price rise, Sir Josiah said that to meet future load growth, 10,910 MW of new conventional generating plant would be commissioned between now and the end of 1964. Because of higher thermal efficiency and lower capital cost per kW, it seemed likely that, in conventional stations, the relative cost of electricity would continue to fall, provided the cost of coal did not increase more rapidly than that of commodities in general. Regarding nuclear energy, the story was equally stimulating but rather different. The capital cost of nuclear power stations, even of the 1962 vintage, seemed likely to be between two and two and a half times the cost of the equivalent coal-fired stations.

Sir Josiah gave six methods whereby the load factor of electricity supply could be improved, or prevented from deteriorating. These were that all new buildings should be insulated; heat storage methods should be employed to the maximum practicable extent; off-peak processes should be encouraged; the possibilities of disconnectible loads should be explored; we should sell every kind of apparatus that had long-hour use and the use of which was not increased by low ambient temperatures; and we should sell every kind of apparatus that was suitable only for spring, summer and autumn seasonal use. The key to our future as a country was our ability to sell sufficient goods abroad to pay for all necessary imports, said Sir Josiah. Since the cost of electricity was such a small proportion of the production costs of manufactured articles, the electricity industry's major contribution would be through the service rendered in enabling manufacturers to do things more effectively and cheaply.

The conference was concluded with a luncheon over which Mr. W. N. C. Clinch, chairman of the E.D.A. Council presided, and in a brief speech expressed thanks to Sir Josiah Eccles for his address.

*Mr. J. Moule (chief commercial officer, South of Scotland Electricity Board) presenting his paper at the E.D.A. annual conference. Seated, left to right, are Mr. J. I. Bernard (director and secretary, E.D.A.), Mr. R. R. B. Brown (chairman, Southern Electricity Board), Sir John Pickles (chairman, South of Scotland Electricity Board)*

# "SCAFELL PIKE"

## BRITISH RAILWAYS TYPE 4 DIESEL-ELECTRIC LOCOMOTIVE

THE first of ten Peak Class 2,300 h.p. diesel-electric locomotives fitted with Sulzer engines and Crompton Parkinson electrical equipment has recently been completed for service on British Railways. These are the most powerful main-line diesel-electric locomotives to be erected in British Railways workshops under the modernisation programme. The ten now under construction at Derby locomotive works will go into service on the London Midland Region, and a total of 147 similar locomotives will eventually be built at Crewe and Derby. The locomotive is of the 1 Co-Co 1 wheel arrangement, with a full-width body having a driving cab at each end, and is equipped to operate in multiple with other locomotives having Crompton Parkinson, British Thomson-Houston or English Electric electrical equipment.

The principal characteristics are as follows:—Maximum weight in working order, 138 tons; maximum tractive effort, 70,000 lb; continuous tractive effort, 41,500 lb at 16·5 m.p.h.; maximum service speed, 90 m.p.h; driving wheel diameter, 45in; carrying wheel diameter, 36in; length over buffers, 67ft 11in; fuel oil capacity (engine and boiler), 840 gal; and water capacity for boiler, 1,340 gal.

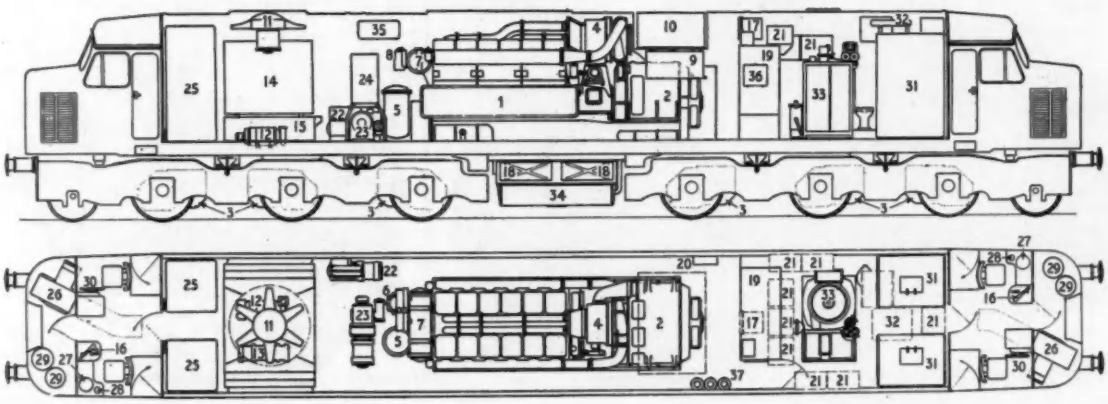
Separate compartments are provided in the superstructure for the power unit and controls. Cooling air for the main and auxiliary generators is drawn from the engine room and expelled through the floor to prevent recirculation, and provision has been made for fitting air filters in the body side. A self-draining sealing plate is provided under the floor between the cab bulkheads to prevent leakage of oil and water on to the bogies and battery equipment. Clean fuel oil spillage is collected separately and ducted back to the main fuel tank.

The cabs are fitted with side doors behind the driver's and assistant's adjustable seats, and the windows immediately in front of the seats are double glazed, an electric heating element fitted in the air space acting as a demister and defroster. There is an electric cooker in each cab, and the heating is by electric radiators. A 96-cell lead acid battery, with a capacity of 142 Ah at the 5-hour rate, is contained in four pull-out boxes suspended from the underframe, and battery charging sockets, hand inspection lamp sockets and external lighting connections are provided on each side of the locomotive. Steam for carriage warming comes from a Stone-Vapor boiler.

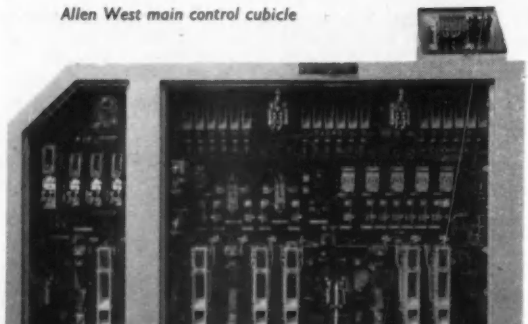
The engine is of the Sulzer 12LDA28 twin-bank, pressure-charged, twelve-cylinder, four-stroke type rated at 2,300 h.p. at 750 r.p.m. Some of the later engines will have an increased continuous rating of 2,500 h.p. at 750 r.p.m. with a test bed one-hour rating of 2,750 h.p. The cylinders are arranged in two vertical banks of six, each bank with its own crankshaft driving a common shaft through straight spur gearing. A step-up ratio of 1:1·44 is employed in the gearbox to increase the main

*Diagram of the equipment arrangement*

1. Diesel engine. 2. Main and auxiliary generators. 3. Traction motor. 4. Pressure charger. 5. Lubrication oil filter. 6. Lubrication oil strainer. 7. Heat exchanger. 8. Engine instrument panel. 9. Engine air filter. 10. Exhaust silencer. 11. Radiator fan. 12. Combined pump set. 13. Convertor set. 14. Radiator panels. 15. Radiator drain tank. 16. Master controller. 17. Voltage regulator. 18. Battery boxes. 19. Main control cubicle. 20. Instrument cubicle. 21. Resistance frames. 22. Air compressor. 23. Exhauster. 24. Brake gear cubicle. 25. Main fuel tank. 26. Traction motor blower. 27. Vacuum brake valve. 28. Independent air brake valve. 29. Air reservoirs. 30. Handbrake wheel. 31. Boiler water feed tank. 32. Boiler water treatment tank. 33. Steam generator. 34. Boiler water feed tank. 35. Fuel and water header tanks. 36. Fuse box. 37. Fire extinguisher cylinder



Allen West main control cubicle



generator speed to 1,080 r.p.m. at full load, permitting a smaller and more compact generator group.

The cooling water circulation, lubricating oil priming and fuel transfer pumps are driven by a single electric motor and can be run independently of the engine to prime the circuits before starting and ensure even cooling of the water jackets, pistons and bearings after stopping. Cooling air is drawn through the Serck radiators by a motor-driven fan mounted in the roof.

The generator group is coupled to the synchronising pinion of the diesel engine and is mounted on an extension of the engine framing. The main generator is a ten-pole self-ventilated machine with a continuous rating of 1,531 kW, 580 V at 1,080 r.p.m. The auxiliary generator is an eight-pole, self-ventilated machine with a continuous rating of 90 kW, 220 V at all speeds between 650 and 1,080 r.p.m. The main and auxiliary generators are combined, both armatures being mounted on a hollow cast steel rotor bolted at one end to the engine output flange and mounted in a single roller bearing at the other, the armature assembly acting as a flywheel for the engine. The main generator commutator is at the driving end and the auxiliary generator is partly accommodated within the field system of the main generator to reduce length. Compensating windings are fitted to the main generator, arranged so that any field coil can be removed and replaced with the compensating winding in position. A combination of glass and mica insulation is used throughout to permit high temperature operation, and the brushgear is carried on a ring which can be rotated by a crank handle to gain access to all brush arms from a convenient working position in the engine room.

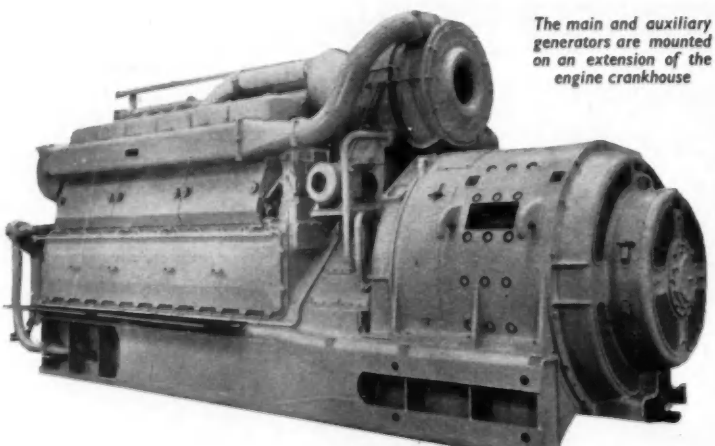
The six traction motors are series-wound machines with a continuous rating of 305 h.p. at 580 V and a one-hour rating of 305 h.p. at 530 V. The motors, which are axle-hung and connected in permanent parallel across the main generator, also have rotatable brush gear. The gear-wheels are of resilient construction and consist of a hub and toothed rim connected through rubber bushes which cushion mechanical shocks due to accelerating forces and track irregularities. The motors are force-ventilated by two blowers, each having an 11½ h.p. motor arranged for two-speed operation, and supplying 6,750 c.f.m. of ventilating air to three traction motors.

The Allen West control equipment is housed in a dust-tight cubicle situated at the generator end of the engine compartment. The engine starting, traction motor and field-weakening contactors are all cam-operated, the motor reversers are electro-pneumatic and the contactors for the auxiliary machines are electro-magnetic.

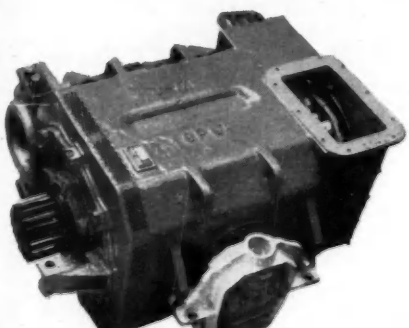
The control scheme is fully automatic and the driver operates only one power controller, movement of which from the idling position increases the engine speed and output. An oil servo-motor in the engine governor drives the generator field regulator which automatically adjusts the excitation of the generator to balance the electrical loading with the predetermined engine output at any particular engine speed. Maximum tractive effort is reached at a low engine speed so that a high value of engine r.p.m. is not necessary to start the train. There are five stages of traction motor field weakening, automatically controlled by the generator load regulator and a current relay.

A deadman's device guarding against driver incapacity is among the protective devices fitted. The locomotive cannot be moved until there is sufficient compressed air and vacuum to operate the locomotive and train brakes and loss of water pressure or lubricating oil pressure shuts down the engine. Loss of air or vacuum also cuts off power and failure of a traction motor blower illuminates the fault light. All indicator lamps are arranged to glow during normal conditions and light up for fault indication.

The main and auxiliary generators are mounted on an extension of the engine crankhouse



Traction motor with the resilient nose suspension used on the centre axle of each bogie



# VIEWS on the NEWS

*By REFLECTOR*

HYDRO-ELECTRIC schemes invariably change the face of the areas in which they are constructed and frequently cause disturbance of the population—human and animal. An outstanding recent instance is the Kariba scheme on the Zambesi River in which a great animal rescue operation is in progress. Rather less serious, although no doubt of importance to those concerned, is the position of the Festiniog Railway in relation to the pumped storage scheme which the Central Electricity Generating Board is carrying out in the area. The railway used to run to Blaenau Festiniog. Part of the line will be flooded by the C.E.G.B. arrangements and, according to the *Manchester Guardian*, it had been the intention of the company running the railway to re-open that section "before the electricity authority thought of their scheme." The question of compensation will go before the Lands Tribunal and the company has prepared a diversion scheme one feature of which is the carrying of the line over the dam of the hydro-electric reservoir.

* * *

As reported by the *Kentish Mercury*, the Lambeth magistrate remarked in a meter robbery case:—"It's time a meter was invented that can defend itself against easy robbery." There is scope for inventive genius here. I suppose it would be possible to devise a meter so equipped that anyone tampering with it would receive a sharp rap over the knuckles. It's only a question of expense of course.

* * *

Some time ago the *Electrical Review* took advertisers to task for not including prices in their public announcements. The subject has been raised in *Topic* (the A.E.I. news sheet) by a Siemens Edison Swan man. He says that the would-be purchaser asks three questions:—

> "Does the equipment do the job I want? Is it within the price range I can afford? Does it represent value for money? When no price is quoted I often have a sneaking feeling that the answer to the second and third may be 'No.'"

While I agree with these views, there is some force in the explanation offered in an editorial footnote. It is said that some journals require advertisement "copy" up to three months before publication and in the meantime there may be purchase tax changes. This applies particularly round about Budget time. But it does not apply, of course, to newspaper advertisements.

* * *

A correspondent asks me why I insist that battery-changing stations are necessary to make the electric "runabout" a practicable method of transport. He suggests that all that is needed is a charger-rectifier on the car itself which could be connected to any domestic power point during the whole of the car's stationary time. This, I agree, is a good idea but it still limits the runabout's radius of operation. There are many purposes for which an electric car with a battery "life" of up to 80 miles is admirably suitable but the ordinary car owner wants to go further afield. In the absence of any known battery capable of being charged in a very short time the only way of achieving long-distance travel is by battery-changing stations. My correspondent, who is interested in a particular electric runabout, believes that such a system will be developed "in due course."

* * *

A visit by Mr. Krushchev to the exhibit of David Brown Industries, Ltd., at the Leipzig Trade Fair is described in the *Newsletter* published by the company. Mr. Krushchev saw a "Hydrax" gear hobbing machine and was told, by Mr. L. Bradburn, through an interpreter, that

> "the machine was cutting tractor transmission gears in pairs, each gear having 50 teeth on a 55 mm face, with a floor-to-floor time of ten seconds. Mr. Bradburn explained that this machine had introduced a new conception of gear hobbing, cutting helical gears without the need for a complicated differential mechanism and lead screw as normally used."

The report goes on to say that if this seemed a technical imposition on the political leader it did not appear to perplex Mr. Krushchev. I am sure that he has had more perplexing problems in his time.

* * *

I have been pulled up for misquoting Belloc on "Lord Finchley" in my notes of 17th April. My corrector points out that the proper version is: "It struck him dead: And serve him right!" He goes on to say: "It is the duty of the writing man to verify quotations if he can." I could have done and so it serves me right.

* * *

Mr. C. Smith, the general secretary of the Post Office Engineering Union, recently complained of the slow progress made in connecting up would-be telephone subscribers, largely because of Treasury cuts in the allocation of funds to the Post Office. Eighty years ago slow progress was attributed to different reasons. The *Electrical Review* of 1st May, 1879, reported Mr. (later Sir) William Preece as saying at a Society of Telegraph Engineers' meeting that

> ". . . bad management had checked its use in England, but at the same time . . . the number in use considerably exceeded 500, as a large number were employed which did not pay a royalty. He thought that the extensive use of telephones as well as call instruments in America, was due to necessity, as it was difficult there to obtain errand boys to carry messages. The difficulties which ensued from induction on lines when fast speed instruments were employed was also pointed out as a reason why the telephone was not extensively employed."

# Power Station Auxiliary Supplies

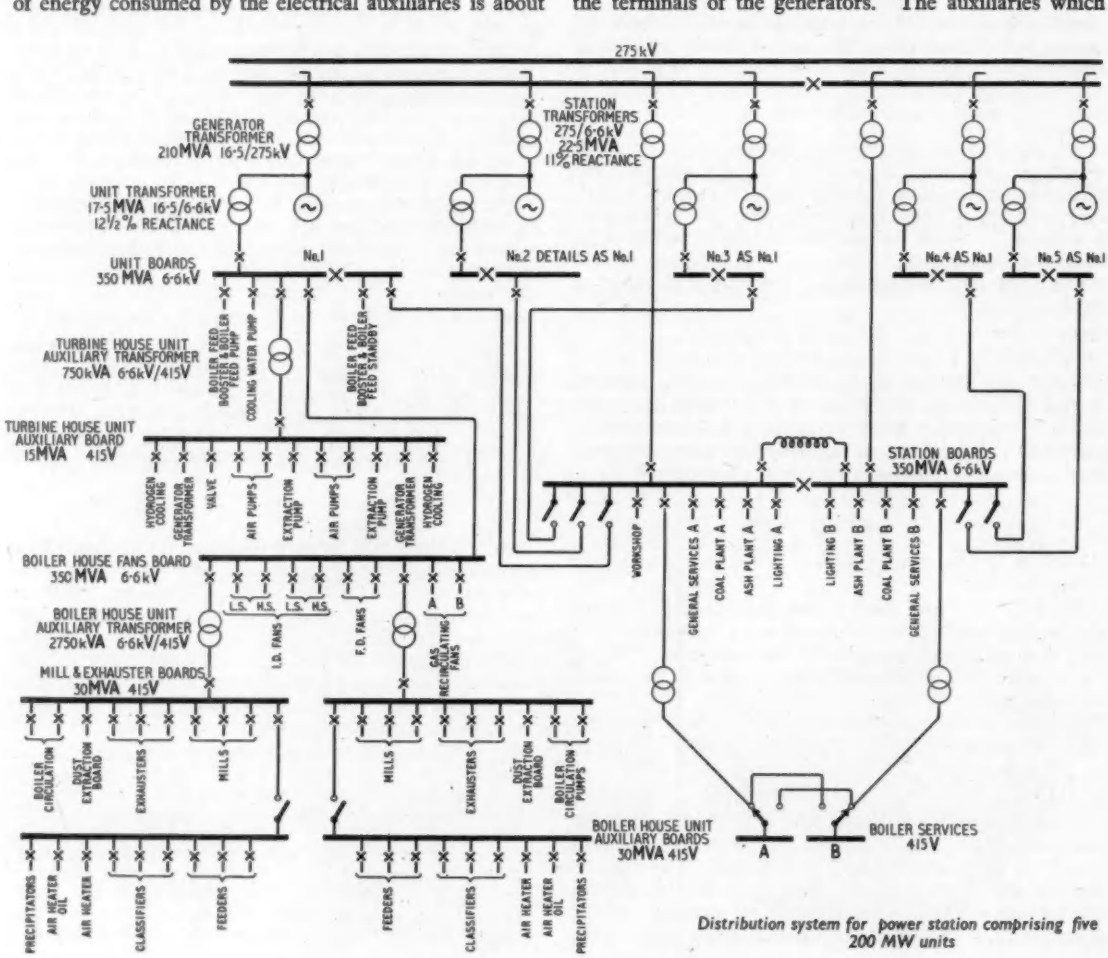
By D. A. DEWISON

**Summary by the author of a paper entitled "Electrical Supplies to Power Station Auxiliaries" which was presented at a meeting of the Supply Section of the Institution of Electrical Engineers on 22nd April**

ONE of the most important considerations in the efficient and reliable operation of a power station is the effectiveness of the electrical supply to the auxiliaries. The electrical system must provide adequate power for driving the auxiliaries and the connections must be arranged in such a way that the greatest reliability is achieved at a reasonable cost. One of the ways in which reliability can be achieved is to design the electrical supply system to be as simple as possible so that the operators can readily visualise the system at any time and the possibility of mal-operation is reduced to the minimum.

For a conventional coal-fired power station the amount of energy consumed by the electrical auxiliaries is about 4 to 7 per cent of the total station output; nuclear power stations require considerably more than this. Various systems of connection have been employed but the arrangement which is now used almost exclusively is the unit transformer system. This is ideally suited to the unit principle of power station operation whereby one boiler and one turbine operate as an entirely separate unit in a multi-unit station.

The distribution system for a power station comprising five 200 MW units is illustrated herewith. In this plant two sources of supply are available: (1) from the station transformers which are connected to the grid system and (2) from the unit transformers which are connected to the terminals of the generators. The auxiliaries which




*Distribution system for power station comprising five 200 MW units*

are connected to the unit transformers are referred to as "urgent" auxiliaries. In other words they are those auxiliaries the loss of which might cause a drop of output from the station. An interconnection is provided between the station boards and the unit boards for starting purposes and also to provide for an emergency standby supply in the event of failure of the unit supplies.

The auxiliaries which are connected to the station transformers are called "service" auxiliaries since their loss would not affect the output of the station, at least until some considerable time had elapsed. Other auxiliaries such as the barring gear, which is used for starting up the unit, are also included as, although they are associated with the unit, they are not "urgent." The connections are arranged so that paralleling can be made at the 6·6 kV switchgear and it will be appreciated that this operation can be carried out only by an experienced operator. It is not possible to parallel at the 415 V level.

Supply to auxiliaries such as the standby boiler feed pumps and booster pumps are connected in such a way that only simultaneous failure of both the unit and station supply sources can result in the loss of boiler feed water. Facilities are provided for transferring these auxiliaries from the station supply to unit supply when they have come into operation. A reactor is connected between the two station transformers to reduce the fault level rating of the switchgear and at the same time interlocking is provided to prevent the two transformers being paralleled unless the reactor is in circuit.

When a unit is started up a supply is taken from the station transformer to the unit board and the unit is brought up to speed, synchronised with the grid system, and very lightly loaded. After this has been done the unit and station transformers are check synchronised and paralleled. The station transformer is then tripped out which leaves the auxiliaries receiving their supply from the unit transformer. When the unit is being shut down the reverse process is carried out.

When deciding whether an auxiliary should be classified as "urgent" or "service" it is first necessary to examine its function and consider its relative importance. The manner in which the auxiliaries have been classified for a typical station is illustrated in the diagram.

## Operating Voltages

In modern power stations the auxiliary loading is so great that the normal industrial voltage of 415 V is inadequate. In most stations 3·3 kV is employed, but some recent designs have required 6·6 kV and for very large stations 11 kV becomes necessary. These higher voltages are, of course, stepped down to 415 V for the smaller auxiliaries.

In the specifications relating to major plant items in a power station there is always a clause which specifies the voltage to be used for the motors. The standard practice where the main voltage is 3·3 kV is to operate all motors rated at up to 150 h.p. at 415 V. Where the main voltage is 6·6 kV, however, motors up to 300 h.p. are operated at 415 V. No standards have so far been laid down for 11 kV, but it is generally considered undesirable to have motors much below 1,000 h.p. on 11 kV circuits. These standards have not been strictly adhered to in all cases because in certain circumstances there may be advantages in going outside these limits.

When the distribution system is being designed a number of factors must be integrated such as choice of voltage, switchgear rating, loads, voltage regulation and economics. One of the most important design considerations is the impedance of the station and unit transformers because this governs the MVA rating of the switchgear and the voltage regulation of the system. It is necessary to keep the switchgear rating as low as possible because the higher the rating the higher the cost. If the rating is to be reduced it is necessary to have a high transformer impedance but this conflicts with the desirability of having good regulation, i.e. the higher the impedance the greater the voltage drop. It is obvious that a careful consideration of all the factors involved is necessary to determine the point at which the most satisfactory compromise is achieved between these conflicting requirements.

## DISCUSSION

The discussion was opened by Prof. R. O. Kapp (Kennedy & Donkin) who said that although to the uninitiated the term "auxiliaries" might suggest that they were unimportant, the design, choice, planning and maintenance of auxiliaries, together with operational problems, occupied a large part of the staff's attention. In fact, a power station could be looked upon as a collection of auxiliary plant with a turbo-alternator that was relatively little trouble. On the economic side, when the station supervisor was concerned with the cost per kWh, he was not interested in the first, second or even third significant figure which he already knew, but in that small fraction per cent which he was concerned to improve.

Mr. C. Bottrell (English Electric) observed that too little information had been published on auxiliary loadings. Such information was of great assistance to station designers. The paper contained only a cursory reference to nuclear power stations. There were two very good reasons why supplies at these stations should be even more reliable than the more conventional station supply—safety considerations and the fact that once the reactor had been tripped out, it took very much longer to get back into service.

Mr. D. E. Bird (Ewbank & Partners) said he thought the unit system was now accepted as the only reasonable system of supply to the stations concerned, but there were many alternatives in voltages and arrangement of switchgear. It was apparent that a voltage higher than 3·3 kV would have to be used in larger stations, but 6·6 kV left a big batch of motors to operate on 415 V. The incremental cost was not the only factor to consider, because the size of transformers proposed involved heavy currents at 415 V and therefore heavy cable. He would prefer a three-voltage system, keeping the 3·3 kV so that motors could be used down to 150 h.p.

Mr. W. N. Waggott (Merz & McLellan) said that he had been alarmed to find from a study of breakdowns that there had been some bad planning, many motors being graded too small for the voltage. Impulse testing had been suggested, but he felt sure this was not the right approach. This was proper planning, proper design of motors and ensuring that terminal arrangements were sound. There should be the closest collaboration, when planning auxiliary supply arrangements, between mechanical and electrical interests to ensure that they were technically and economically sound.

Mr. F. J. Hutchinson (Kennedy & Donkin) said that many motor terminal box explosions had occurred during the past twelve months. These occurred only at 3·3 or 6·6 kV but the reasons were not obvious. There must be a fault to start with and this was probably due to repeated condensation affecting the insulation. Specifications should provide that a terminal box should be airtight and it should be equipped with barriers to separate the studs or other phase connections.

Mr. A. Abbott (National Coal Board) said that while

the generating authority in this country was standardising machines of 200 MW and over, it should not be forgotten that British manufacturers would continue to supply smaller machines, possibly 30 MW, for overseas customers and for industrial purposes.

Mr. F. H. E. Myers (C.E.G.B.), referring to the use of operational statistics of plant already in service as a useful guide in assessing loads, said that an analysis of Central Electricity Authority statistics for the year ended 1st April, 1957, showed that auxiliary power varied from 4 to 7 per cent, depending on the loading of the station. The higher the average load the lower the percentage of auxiliary power.

Mr. J. E. Stubbs said that the fundamental switchgear problem was still how to handle economically the heavy load and short-circuit currents involved. The difficulty had been overcome on the main circuits by increased switching voltage and he thought the same solution should be applicable to auxiliary gear.

Mr. C. J. O. Garrard, referring to the quick-switching scheme which had been mentioned by Professor Kapp, said he understood it was to be used for the auxiliaries in one of the nuclear stations now under construction in this country. He believed a preliminary study had shown that difficulties due to switching off and on large induction motors rapidly were less severe than was at first thought.

Mr. T. Molyneaux commented on the necessity for close co-operation between mechanical and electrical engineers from the point of view of the mechanical engineer. On battery supplies there was a good case in modern plant for barring gear. Its absence might mean permanent damage in the event of a crash shutdown.

# British Electrical Power Convention

## Programme for Torquay

THE full programme of the eleventh British Electrical Power Convention to be held at Torquay from 1st to 5th June has now been sent to delegates. This year's president is Mr. C. R. King, C.B.E., Companion I.E.E., M.Inst.F., deputy chairman of the Central Electricity Generating Board, and twenty-seven organisations are represented. The Convention office will be at the Pavilion where the business sessions are being held.

This year's exhibition is being arranged on a site adjoining the Pavilion and the first official function, on the afternoon of Monday, 1st June, will be the opening ceremony by the president. Although this time there will be only forty exhibitors, the display will be quite a representative one and will back up the Convention theme "Electricity—Its Contribution to the Standard of Living." On the same day the customary luncheon of the local Rotary Club to Rotarian delegates will be held at Callard's Café.

Tuesday's proceedings open with a civic welcome by the Mayor of Torquay and the delivery of the presidential address will follow. A luncheon organised by the Electrical Association for Women will be held at the South Devon Technical College. In the afternoon a paper will be presented by Mr. F. H. S. Brown, B.Sc., M.I.Mech.E., M.I.E.E. (member, Central Electricity Generating Board) and Mr. J. Henderson, M.C., B.Sc., A.R.T.C., M.I.E.E. (chief engineer, South of Scotland Electricity Board) on "Progress on the First Nuclear Power Stations—Bradwell, Berkeley, Hinkley Point and Hunterston." A discussion will follow. In the evening the Mayor and Mayoress of Torquay will hold a reception and dance at the Town Hall.

"Priority No. 1" (the provision of a reliable supply of electricity at a constant voltage and at the cheapest possible price) is the title of a paper by Mr. A. N. Irens, M.Sc., D.F.H., M.I.E.E. (chairman of the South Western Electricity Board) to be presented and discussed at the Wednesday morning session. During the session the ladies will be entertained to coffee by Mrs. King at the Imperial Hotel. On Wednesday afternoon Mr. C. C. Hyams, M.M. (president of the Electrical Contractors' Association) will present a paper on "The Scope of Installation Engineering," and Mr. E. J. Sutton, M.I.E.E. (chief technical officer, National Inspection Council for Electrical Installation Contracting) will deal with the objects and organisation of his Council. A discussion will follow.

The final paper of the Convention, on the Thursday morning, will be "Lighting and the Common Weal" by Mr. O. W. Humphreys, C.B.E., B.Sc., M.I.E.E., F.Inst.P. There will be no afternoon session but in the evening the annual dinner will be held at the Palace Hotel, followed by a cabaret and dance at the Town Hall.

The proceedings will conclude on the Friday morning (5th June) when there will be the customary "Electrical Forum," at which an expert panel will reply to questions put by delegates, followed by the annual general meeting.

### Next Year's Convention

Arrangements for the 1960 Convention are already in hand. It is proposed to hold it at Bournemouth from 30th May to 2nd June. Viscount Chandos (chairman, Associated Electrical Industries, Ltd.) will be the president. It will be remembered that Sir Claude Gibb, who would have taken office in June, died in January last.

## ASTA Tests for Fuses

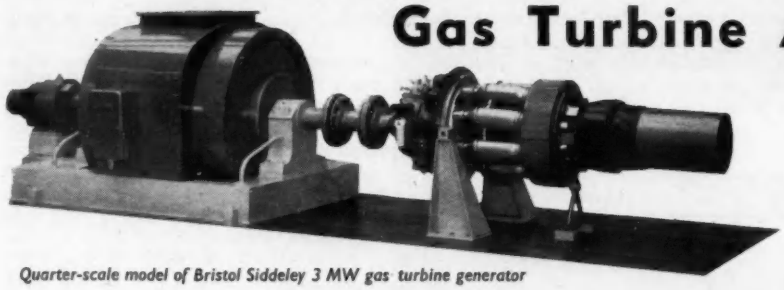
IT has been apparent for some time past that B.S. 88: 1952 is capable of misinterpretation and therefore that it is necessary to define very clearly the criteria for short-circuit testing and certification of low- and medium-voltage electric fuses.

ASTA No. 20-1959 has been prepared with the purpose of setting down for the convenience of manufacturers the rules which will be applied by the Association if fuses or fuse links are submitted to it for test and certification. Particular attention has been given in section 3 to the identification of fuses and in section 6 to the assessment of performance, while in section 8 of the rules the range of applicability of certificates defines the conditions which must be met if it is desired to claim "ASTA certification" for a whole range of fuses or fuse links as well as the method of marking fuse links which have been certified and covered in this way.

Copies of ASTA 20, which supersedes ASTA 6, can be obtained from the Association of Short-Circuit Testing Authorities, 36, Kingsway, London, W.C.2.

# Gas Turbine Alternator

## REMOTELY CONTROLLED 3 MW GENERATOR DRIVEN BY MODIFIED AERO ENGINE



*Quarter-scale model of Bristol Siddeley 3 MW gas turbine generator*

A LIGHTWEIGHT plant intended to meet the requirements of public supply companies, large industrial concerns and contractors for peak load generation, emergency supplies, standby duty and for use as a mobile installation has been developed by Bristol Siddeley Engines, Ltd. The plant consists of a "Proteus" aero engine adapted to operate on diesel oil and a 3 MW Electric Construction Co. alternator. The overall efficiency is 22·3 per cent. As announced in the *Electrical Review* last week (p. 795), the South Western Electricity Board has placed an order for two of these sets.

The 1½ ton engine is a simple gas turbine without heat exchanger and consists of a compressor delivering air to separate combustion chambers, a compressor-driving turbine and a power turbine. A high thermal efficiency is attained through the development of good compressor and turbine efficiencies and through the use of a high compression ratio.

The Bristol free turbine principle is used, in which the compressor-driving and power turbines are mounted on concentric but mechanically independent shafts. This arrangement enables each system to run at its optimum speed under all conditions and has two valuable advantages in the turbo-generator application. A relatively small starter battery suffices because only the compressor system is rotated by the starter. Also, the alternator is coupled to a unit of low inertia, which facilitates automatic synchronisation.

Air is taken in radially near the mid-length of the engine and travels through twelve axial-flow compressor stages to a single centrifugal stage whence it flows in the reverse direction through eight combustion chambers. These discharge through two two-stage turbines. The first turbine drives the compressor, and the second drives through a central shaft a compound epicyclic reduction gear which, in turn, drives the output shaft.

The alternator is an 11 kV, 1,000 r.p.m., 3,200 kVA protected-type machine with two pedestal bearings and direct-coupled exciters, all mounted on a common bedplate. Direct air cooling of the alternator is employed and the gas turbine requires no cooling water.

The performance achieved on the test bed, when running in parallel with the grid for "peak-lopping," with the control system designed to hold the fuel flow and power constant at 2,570 lb/hr and 4,400 h.p. respectively at ambient temperatures below 30 deg F, was an output of 3,140 kW; above this temperature the set will run at a constant compressor speed, giving an output which falls off with increasing air temperature. Maximum power is thus available in cold weather when it is most likely to be needed.

### Control and Starting

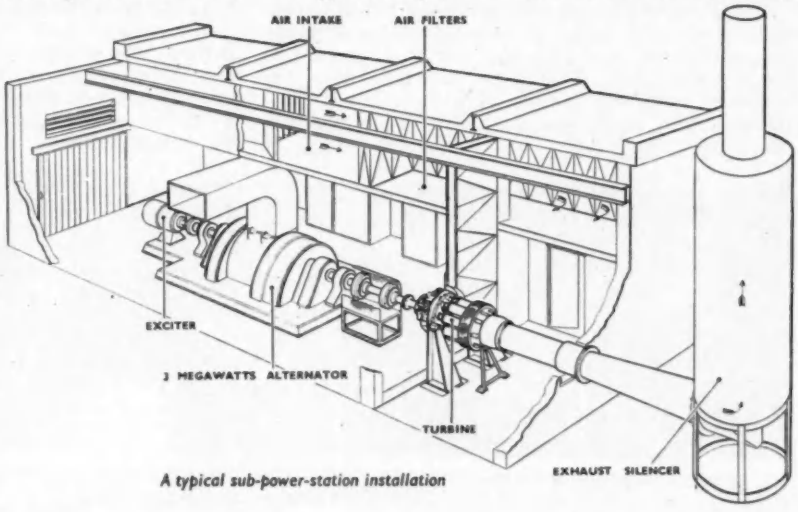
The turbo-generator is entirely automatically controlled and starting is effected by a remote push-button control. A 110 V battery provides current for the starter, for those ancillaries which have to run before the engine is started and for energising the solenoid for circuit-breaker closing.

The starting sequence is entirely automatic. In the unlikely event of the engine failing to start up after operation of the starter push-button, steps are taken automatically to clear the combustion chambers of unburned fuel and to avoid the risk of a wet start at the second attempt.

Once the engine has started, a corrector motor opens the throttle until mains frequency is reached and the alternator is in phase. It is then automatically put on the line and the engine goes to full throttle. If there is no mains supply to control the corrector motor it will provide a frequency of 52 c/s under no load, falling to 50 c/s at full load.

There are protective devices to prevent overspeeding in any circumstances and to stop the engine in case of failure of oil or fuel pressure. Detectors are provided which shut down the engine and discharge carbon-dioxide extinguishers in case of fire.

A typical sub-power-station is illustrated, emphasising




*A typical sub-power-station installation*

the small size of the gas turbine as compared with an equivalent diesel engine. The low weight and complete freedom from vibration of the turbine mean that the only major foundations are those for the generator which, of course, in no way compare in size and cost with those required by a reciprocating engine.

No space heating of the building is required for either alternator or engine. Heaters are built into the alternator to ensure that the windings are kept warm and dry at all times. The elimination of space heating makes it unnecessary to provide shutters with automatic operation on the engine air intake and on the alternator ventilating air inlets.

Very little maintenance is required by this type of gas turbine. After every 100 hours of operation the filters should be inspected, the plant run and the instrument readings logged. For intermittent operation of the type proposed, the engine should be partially dismantled after every 1,000 hours' running. A complete strip will seldom, if ever, be required. The engine can be removed and a replacement installed by two skilled and one unskilled man in six hours.

# E.A.W. Conference

*Record Number of Delegates at London Meeting*

THE general theme of the 34th annual conference of the Electrical Association for Women which was held at the Connaught Rooms, London, last week was "Education in a Scientific Age." Over 600 delegates from all parts of the country, including Scotland and Wales, were in attendance, representing the 184 branches of the Association. During the morning the annual general meeting was held under the chairmanship of Miss H. Shaw (chairman, E.A.W.) deputising for Viscountess Kilmuir, D.B.E., the president.

Presenting the annual report, Miss Mary George (director) said that the educational activities of the Association had extended to many new spheres, this being especially true of branch development, examination work, exhibitions and the "Wiring for Everywoman" campaign. Many branches, she said, now had waiting lists as they could not accommodate new members in their meeting rooms. Reviewing the progress of the branches, the report showed that eight new branches were formed last year. Several branches had arranged evening and afternoon meetings to suit the convenience of their members and planned programmes on the Association's "Electricity for Everywoman" theme. Lectures, demonstrations and films on the ring-main wiring circuit, floor warming developments and the application of electricity in the garden had been arranged by many branches.

By the end of 1958 the total number of E.A.W. certificates in electrical housecraft awarded to demonstrators and saleswomen was 3,036 and the total awarded to teachers was 2,299. During the year there were 257 successful candidates for the electrical housecraft certificate, while in the teachers' examination 77 were successful. The E.A.W. Diploma was awarded to 17 demonstrators, making a total of 538. The number of teachers who hold the Diploma is at present 94.

The adoption of the annual report was proposed by Mrs. D. Mendelson (Edinburgh Branch) and seconded by Miss M. Wilson (Bolton Branch). The accounts were presented by Mrs. W. S. Carty, hon. treasurer, and their adoption was proposed by Miss L. Story (Romford Branch) and seconded by Mrs. E. M. Spear (Barry Branch).

Later a ballot was held to fill the six vacancies on the National Executive Committee and of the 13 candidates the following were elected:—Miss N. Balls, Mrs. A. R. Hutchison, Miss M. Waite, the Hon. Mrs. J. H. Bruce, Mrs. H. S. Davidson and Mrs. N. A. Hawley.

The Cheltenham Silver Jubilee Awards, a prize fund inaugurated by the Cheltenham Branch to commemorate their 25th anniversary in 1951, were presented to the housewife candidates who gained the highest marks in the 1958 Home Workers' Examination. Prizes of £5 and £2 10s, to be spent on electrical equipment for the home, went to Mrs. I. Barnes, Nottingham Branch (first) and Mrs. H. Kingston, Blackburn Branch, and Mrs. B. Paul, Galashiels Branch (joint second). The presentation was made by Mrs. D. Haines (hon. secretary, Cheltenham Branch).

## Annual Luncheon

At the annual luncheon which followed the meeting, guests included leaders from all branches of the electrical industry. In a short address of welcome Viscountess Kilmuir, who had arrived back from New York only that morning, warmly greeted the 800 members and guests, an all-time record, and apologised for her absence from the annual meeting. She then introduced the three

*At the Association's annual luncheon: (1) Viscountess Kilmuir; (2) Mr. Reginald Maudling; (3) Sir Henry Self and Lady Mountbatten; and (4) Lady Bragg and Sir Christopher Hinton*

*Miss Mary George, director, E.A.W. (extreme right) with (left to right) Mesdames H. Kingston, B. Paul and I. Barnes (winners of the Cheltenham Silver Jubilee Award) and Mrs. D. Haines (hon. secretary, Cheltenham Branch)*

principal speakers, the first of whom was Mr. Reginald Maudling (Paymaster General) who proposed the toast "Education in a Scientific Age." There was little doubt, he said, that this country was a scientific nation. Apart from some raw materials such as coal and china clay, we had little to depend on except our scientific knowledge. He spoke of the importance of future scientific programmes and urged that training should be stepped up, stressing the fact that we could not have full development in this country unless the Government and industry worked together. The electrical industry, he said, was developing faster than others and the country could be proud of its development in the research field. It was, however, of little use producing new scientific aids to make life easier without ensuring that women knew what were available and how to use them. In this way, he said, the Association was playing an important part.

The response was made by Lady Bragg, wife of Sir Lawrence Bragg (director of the Royal Institution) who, emphasising the woman's part in a scientific age, said that to educate a man was to educate a person, but to educate a woman was to educate a family. Proposing a toast to "The Electrical Association for Women," Lady Mountbatten expressed her great admiration for the work of the Association. She also paid a tribute to the late Dame Caroline Haslett, former director of the E.A.W.

Lady Kilmuir, who responded, referred to the extended opportunities for women in the scientific field offered by the Caroline Haslett Memorial Fund.

Later that same afternoon the delegates were invited to a special reception arranged by A.E.I.-Hotpoint, Ltd., at the Hotel Russell where there was a short film show followed by tea.

# LETTERS TO THE EDITOR

*Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.*

## Teaching of Electrical Engineering

MR. A. T. CRAVEN (*Electrical Review*, 10th April) does a useful service in discussing the teaching of electrical engineering in detail; too many discussions are concerned with educational philosophies in an abstract manner and give little help to teachers who wish to know of the methods of their colleagues. A teacher who openly exposes his methods to the criticism he knows they will receive and, indeed, invites such criticism, is to be congratulated both on his courage and his enthusiasm.

Personally, however, I am saddened to learn that "the experimental laws of Coulomb, Ohm, Ampère and Faraday" can no longer be considered as fundamentals of electrical engineering, and I hope we can keep this a dark secret until they cease to be used as such in all the leading professional journals.

I think I must take exception to Mr. Craven's identification (paragraph "Electric Field in a Dielectric Medium") of the electric force $\mathscr{E}$ with the potential gradient; although numerically equal in the context quoted, it must be remembered that they are different quantities, and that an electric force can exist in a varying magnetic field where there is no unique electric potential.

Further, I am not sure whether it is a good plan to deduce the law of electromagnetic induction solely from a consideration of a changing circuit in a constant magnetic field; does it follow that the same law will apply to a stationary circuit in a changing magnetic field? I would prefer to see $\mathscr{E} = -\frac{d\phi}{dt}$ used as a basic experimental law embodying Faraday's experimental results (even if they are no longer fundamental); then if $\phi$ is distributed uniformly over an area A, with density B,

$$\mathscr{E} = -\frac{d(BA)}{dt} \text{ or } \mathscr{E} = -\left(B\frac{dA}{dt} + A\frac{dB}{dt}\right)$$

and Mr. Craven's example appears as only one-half of the story.

*The Polytechnic,*
*Regent Street, London, W.1.*
J. H. GRIDLEY.

## 13 A Socket Outlets

OUR attention has been drawn to correspondence in the past few issues of your valuable paper, with reference to 13 A flat pin socket outlets to B.S. 1363.

Whilst we do not manufacture socket outlets, we have evolved two multi-plug adaptors for these. The first has two 13 A shuttered outlets and the second one 13 A and one 5 A three-pin shuttered outlets. Both adaptors are fused, available with one extra wirable outlet, and the shutters are of the double safety type, i.e. requiring all three pins to be inserted before the phase sockets are exposed. Our 5 and 13 A outlet multi-plug adaptor incorporates a printed circuit. This is the first multi-plug anywhere to use this most up-to-date and reliable method of contacts.

We feel that some of the above information may be of interest to your readers, in particular to Mr. R. C. K. Money in reply to his letter of 20th March, as our adaptor has been specially designed to meet the needs detailed in his letter.

*Gateshead-on-Tyne.*
G. F. LOEBL,
Loblite, Ltd.

# KELVIN LECTURE

## *Results of Observations during the International Geophysical Year*

THE fiftieth Kelvin Lecture, which dealt with the International Geophysical Year, was given at the Institution of Electrical Engineers last week by Sir David Brunt, Sc.D., F.R.S., who had been responsible for the organisation of British participation. Some 30,000 scientists and engineers and perhaps 20,000 volunteer observers had been engaged in the work and more than 100 million meteorological observations made. It had been a triumph of international co-operation, conceived and organised by scientists, Sir David said, but many years must elapse before the tremendous volume of data could be interpreted. There was every reason to think that international co-operation in geophysics had come to stay.

### Solar Flares

The first achievement of the I.G.Y. had been the organisation of a continuous watch on the sun at some fifty stations to yield a record of sunspots and of the bright flares associated with them. Solar flares (the sudden blazing up, to about ten times its normal brilliance, of an area of the troposphere of hundreds of millions of square miles) were found in close association with sunspots and a magnetically complex sunspot could produce up to forty flares during a single passage across the sun's disc.

A magnetic storm was more likely to follow when the flare was near the centre of the sun's disc; when the flare was near the limb of the sun the earth was less likely to be in the line of particle fire. From this it was concluded that the particles were emitted from the sun in a vertical direction. From the flares, radiation in the forms of waves and electrified particles was sent out, the waves travelling with the speed of light and the particles more slowly. The waves, and notably the ultra-violet and X-rays, penetrated down to the D-layer, the lowest layer of the ionosphere, where they produced additional ionisation, giving fade-out of radio signals, by absorption in the D-layer. From the appearance of sunspots it was possible to determine some days ahead the probability of the occurrence of flares. The fade-out started at the first moment of the flashing up of the flare and a record of the fade-out would give the time of initiation of the flare.

The slower-moving particles were deflected towards the geomagnetic poles and only the particles of very high energy reached middle latitudes. All these particles reached the earth one or two days after the flare was seen, giving rise to aurora one or two days after the fade-out of radio signals. The faster-moving particles were believed to be mainly protons with exceptionally high energies, $10^8$-$10^{17}$ eV, travelling with speeds which were an appreciable fraction of the speed of light and capable of disintegrating atmospheric atoms.

It had been found that the ultra-violet rays emanated from the disc of the sun, while the source of the X-rays was the sun's atmosphere or corona. At the time of a flare the lines of force in the adjacent magnetic field underwent a sudden redistribution, suggesting that in the flare there was a sudden conversion of magnetic energy into wave and particle radiation. This might be the answer to the question " What is a flare ? "

From the instruments in satellites, it had been found that up to a height of 700 km the intensity of cosmic rays was in accordance with expectation, but above this level there was a great increase in intensity of radiation, which was interpreted as corpuscular in nature. There were two distinct, widely separated zones of high intensity of radiation. It was believed that this great radiation belt around the earth consisted of charged particles temporarily trapped in the earth's magnetic field.

It had also been found that the atmosphere extended far beyond the level at which it was supposed to end; indeed, Sir David wondered whether there was any such thing as empty space. There was no evidence of empty space within 10,000 miles of the earth. Almost all the observations with rockets and satellites agreed that up to very great heights there were densities of molecules and also of ions far greater than had been believed before, and it now appeared that the earth was in fact within the sun's atmosphere.

By the use of rockets and satellites, it was possible to observe and measure ultra-violet radiation from the galaxy, which could not be observed from the ground because it was readily absorbed in the lower atmosphere. There were strong sources of ultra-violet radiation where nothing was visible and there were no " radio stars." We had gone from visual astronomy to radio astronomy, and in addition there would now have to be ultra-violet astronomy.

To get information from outer space by satellites was not, however, a cheap process; for example, Explorer I had cost £1,400,000 to make and put up, and the U.S.A. received only 3 per cent of the messages which it sent out.

### Pacific Mineral Deposits

Dealing with discoveries in the field of oceanography, Sir David said that it had been found that in the S.E. Pacific there was a mineral-rich region containing manganese and iron, with some cobalt mixed with copper. The value of these metals was estimated at half-a-million dollars per square mile and the area had been variously described as " thousands of square miles " and " considerable."

All geophysicists were eager to continue the close co-operation which had been established, and all the nations represented at the international conference held in Moscow in the summer of 1958 had agreed that co-operation shou'd be continued during 1959.

The vote of thanks to Sir David Brunt was proposed by Sir Josiah Eccles and seconded by Mr. C. T. Melling. Mr. Melling referred to Newton's comparison of his own endeavours in science with a boy picking up pebbles on the sea shore, one here and one there. " We have now," Mr. Melling remarked, " got to the point where pebbles are being picked up with a mechanical shovel. In this country, with our limited resources, we must be very choosy about our pebbles and very careful to analyse them thoroughly."

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Before the delivery of the lecture, the President presented a certificate of honorary membership to Mr. C. W. Speirs, and handed to Signor G. Baricalla, representing the family of the late Signor Luigi Emanueli, the Faraday Medal for 1959, which had been awarded to Signor Emanueli.

# OVERSEAS ELECTRICAL TRADE

## Advance in Exports not Maintained

IN line with the country's total overseas trade, both exports and imports of electrical goods rose in March from the seasonal low level in February. Exports at £19·2 million were £1·4 million higher, but still below the level reached in January and in the fourth quarter of 1958. The value of electrical exports in the first quarter of this year was 4 per cent lower than in the corresponding period of 1958. An exception to this general fall was exports of radio and electronic apparatus which were 22 per cent higher than in the first quarter of 1958. The falls in the other main classes of equipment were: transformers and switchgear, 3 per cent; generators and motors, 12 per cent; cables, 27 per cent; and telegraph and telephone equipment, 12 per cent.

Exports of British electrical goods to the United States were a third higher in the first quarter of 1959 than in the first quarter of 1958. There was also an increase of nearly one-half in exports to Western Germany. Exports

**TABLE I.—ELECTRICAL EXPORTS**

| Class | Month of March, 1959 | Three months ended 31st March, 1958 | Three months ended 31st March, 1959 |
|---|---|---|---|
| | £ | £ | £ |
| Generating sets and generators: | | | |
| Diesel-driven, up to 10 kW | 115,626 | 398,394 | 318,067 |
| Ditto, 10 to 65 kW | 186,755 | 566,057 | 518,681 |
| Ditto, 65 to 200 kW | 227,562 | 664,790 | 469,674 |
| Ditto, over 200 kW | 327,140 | 1,049,413 | 804,054 |
| Spark ignition engine driven | 16,737 | 43,028 | 41,736 |
| Steam turbine driven | 326 | 262,697 | 291,651 |
| Hydraulic turbine driven | — | — | — |
| Other prime mover driven | 26,225 | 36,701 | 108,498 |
| Generators, not exceeding 200 kW | 78,463 | 494,887 | 299,493 |
| Ditto, over 200 kW | 61,398 | 293,333 | 288,620 |
| Parts of generators | 446,449 | 1,868,892 | 1,557,741 |
| Motors, complete, other than railway, tramway and trolley-bus: | | | |
| Up to ½ h.p. | 136,241 | 463,274 | 404,822 |
| Over ½ but under 1 h.p. | 47,750 | 183,632 | 140,571 |
| 1 h.p. to 250 h.p. | 428,563 | 1,508,105 | 1,311,657 |
| Over 250 h.p. | 176,872 | 311,282 | 496,598 |
| Railway, tramway and trolley-bus motors complete and parts of all motors | 152,873 | 750,252 | 538,908 |
| Motor starting and controlling gear | 245,357 | 826,900 | 984,516 |
| | 2,674,337 | 9,721,637 | 8,575,287 |
| Converting machinery | 15,919 | 120,294 | 74,756 |
| Mercury-arc rectifiers | 38,090 | 265,545 | 147,236 |
| Transformers for lighting, heating and power (inc. coils): | | | |
| Not exceeding 7,500 kVA | 569,089 | 2,095,109 | 1,696,356 |
| Over 7,500 kVA | 448,194 | 1,119,326 | 1,329,310 |
| Switchgear and switchboards (not telegraph or telephone), up to 200 A and 660 V | 301,857 | 1,387,018 | 976,640 |
| Ditto, other | 1,186,127 | 3,010,323 | 3,572,093 |
| | 2,559,276 | 7,997,615 | 7,796,391 |
| Primary batteries: | | | |
| Lighting | 82,675 | 291,881 | 304,541 |
| Radio | 410,841 | 861,932 | 1,067,871 |
| Other | 41,797 | 136,024 | 124,824 |
| Parts (excl. carbons) | 46,494 | 143,143 | 126,422 |
| Lamps: | | | |
| Filament, exceeding 28 V | 91,555 | 276,089 | 257,447 |
| Ditto, under 28 V | 27,491 | 87,091 | 97,773 |
| Arc lamps and searchlights | 8,382 | 49,639 | 37,266 |
| Discharge lamps, fluorescent tubes, etc. | 105,490 | 272,456 | 298,712 |
| Radio and television, etc., apparatus: | | | |
| Thyratrons, hot cathode mercury vapour and gas-filled rectifiers (excl. mercury-arc rectifiers), photo-electric cells, stabilising and cold cathode valves, magnetrons, klystrons | 37,915 | 94,525 | 104,646 |
| All other* | 548,358 | 1,160,370 | 1,645,438 |
| Parts (excluding glass bulbs) | 27,713 | 44,886 | 76,645 |
| Radio and television transmitters | 28,751 | 143,563 | 97,537 |
| Commercial radio and radar equipment | 2,002,712 | 3,555,317 | 5,025,560 |
| Domestic radio receivers, mains | 134,879 | 263,424 | 318,211 |
| Ditto, battery | 60,549 | 152,564 | 183,490 |
| Ditto, other (incl. car) | 20,622 | 75,825 | 73,301 |
| Radiograms | 20,360 | 113,319 | 82,780 |
| Television sets | 110,764 | 367,797 | 244,113 |
| Public address equipment | 88,666 | 381,512 | 293,484 |
| Other radio and television apparatus, n.e.s. | 148,460 | 99,874 | 221,019 |
| Components and parts, n.e.s. | 835,286 | 2,359,649 | 2,332,584 |
| | 4,065,035 | 8,762,625 | 10,698,808 |
| Telegraph and telephone installations | 770,553 | 2,734,428 | 2,203,784 |
| Telephone instruments, separately consigned | 121,187 | 713,324 | 292,124 |
| Telegraph and telephone parts | 718,758 | 2,289,718 | 2,417,173 |
| Line apparatus for long distance communication | 219,619 | 570,235 | 619,264 |
| | 1,830,117 | 6,307,705 | 5,532,345 |

| Class | Month of March, 1959 | Three months ended 31st March, 1958 | Three months ended 31st March, 1959 |
|---|---|---|---|
| | £ | £ | £ |
| Cookers | 30,377 | 156,915 | 108,092 |
| Toasters | 11,658 | 74,809 | 49,818 |
| Other cooking apparatus | 28,204 | 112,628 | 97,772 |
| Parts and accessories | 96,982 | 180,813 | 242,858 |
| Space heating appliances | 23,675 | 140,899 | 63,533 |
| Water heating appliances | 30,985 | 75,204 | 90,320 |
| Other heating appliances | 21,156 | 143,803 | 76,194 |
| Parts and accessories | 75,871 | 174,882 | 213,092 |
| Irons | 65,202 | 255,057 | 193,017 |
| Arc welding equipment, a.c. | 33,215 | 255,224 | 99,281 |
| Ditto, d.c. | 69,726 | 83,928 | 173,932 |
| Resistance welding equipment | 6,152 | 42,741 | 43,930 |
| Electric furnace plant | 148,233 | 253,679 | 284,731 |
| Magnetos, ignition | 12,590 | 53,036 | 32,907 |
| Sparking plugs | 118,058 | 437,088 | 412,756 |
| Elec. appliances for aeroplanes, n.e.s. | 412,303 | 801,380 | 1,026,529 |
| Ditto, for motor vehicles, n.e.s. | 428,970 | 1,214,891 | 1,202,373 |
| Ditto, for cycles, n.e.s. | 46,481 | 165,347 | 118,969 |
| Signalling app. (incl. traffic signals) | 194,130 | 525,017 | 546,314 |
| Instruments, commercial | 232,015 | 535,410 | 560,743 |
| House service meters (including parts) | 143,854 | 521,136 | 377,007 |
| Electro-medical apparatus (not X-ray) | 35,193 | 108,991 | 94,110 |
| X-ray apparatus (excl. tubes and valves) | 35,358 | 191,659 | 114,620 |
| Ceiling fans, complete | 130,178 | 354,026 | 281,008 |
| Desk fans, complete and parts of desk and ceiling fans | 10,098 | 80,846 | 37,299 |
| Vacuum cleaners | 169,640 | 435,187 | 424 048 |
| Floor polishers | 72,581 | 210,606 | 210,880 |
| Food mixers | 83,460 | 165,703 | 220,896 |
| Hair clippers and dry shavers | 18,928 | 162,401 | 104,099 |
| Other portable appliances | 24,926 | 65,730 | 61,916 |
| Parts | 117,054 | 381,484 | 307,599 |
| Portable elec. tools (not saws) and parts | 203,901 | 712,330 | 591,617 |
| Cables and wires: | | | |
| Telegraph and telephone, submarine | 11,024 | 196,084 | 49,302 |
| Ditto, other | 432,218 | 1,938,446 | 1,303,050 |
| Cotton, silk or art. silk insulated | 15,004 | 148,192 | 64,049 |
| Enamel, glass or asbestos insulated | 87,921 | 225,492 | 267,184 |
| Paper insulated | 524,692 | 1,904,993 | 1,728,082 |
| Rubber insulated | 343,506 | 1,630,287 | 910,406 |
| Thermoplastic insulated | 170,326 | 646,848 | 590,185 |
| Other | 182,377 | 801,147 | 540,976 |
| | 1,767,068 | 7,491,489 | 5,453,234 |
| Accumulators for motor vehicles | 146,583 | 443,378 | 398,740 |
| Ditto, traction | 19,620 | 74,721 | 62,155 |
| Ditto, radio and other portable | 19,399 | 162,363 | 63,864 |
| Ditto, other | 16,504 | 88,153 | 182,045 |
| Parts and accessories | 55,357 | 339,719 | 206,131 |
| Electric wiring accessories | 188,918 | 369,564 | 547,139 |
| Elec. ceramic ware, etc. (incl. insulators), n.e.s. | 82,325 | 292,824 | 317,001 |
| Insulating cloth and tape | 57,402 | 157,648 | 147,077 |
| Other insulating material | 133,310 | 293,190 | 343,688 |
| Permanent magnets | 35,449 | 158,680 | 130,941 |
| Radio, telegraph and telephone testing equip., n.e.s. | 95,714 | 207,143 | 359,002 |
| Scientific elec. instruments (excl. telegraphic or telephonic, time recorders and time switches) | 399,596 | 1,002,897 | 979,525 |
| Electrical machinery, n.e.s. | 24,835 | 228,772 | 124,933 |
| Electrical apparatus and appliances, n.e.s. | 1,043,825 | 2,676,469 | 3,079,897 |
| TOTAL | 19,160,549 | 57,967,697 | 55,775,519 |

* The figures for 1959 are not strictly comparable with those for 1958.

**TABLE 2.—DISTRIBUTION OF EXPORTS (TABLE 1)**

| Country | Month of March, 1959 | Three months ended 31st March, 1958 | Three months ended 31st March, 1959 |
|---|---|---|---|
| | £ | £ | £ |
| Gibraltar | 9,179 | 114,823 | 31,965 |
| Malta and Gozo | 23,207 | 185,545 | 102,746 |
| Cyprus | 41,650 | 287,809 | 180,809 |
| Sierra Leone | 40,512 | 175,490 | 99,528 |
| Ghana | 209,314 | 503,125 | 575,022 |
| Nigeria | 480,356 | 1,060,939 | 1,416,087 |
| Union of South Africa | 1,402,169 | 5,470,129 | 4,305,449 |
| Rhodesia and Nyasaland | 563,640 | 1,465,056 | 1,557,038 |
| Tanganyika | 42,305 | 151,222 | 124,301 |
| Kenya | 215,579 | 442,736 | 487,523 |
| Uganda | 86,643 | 241,501 | 162,904 |
| Mauritius | 38,873 | 94,293 | 123,320 |
| Aden | 53,859 | 173,931 | 194,582 |
| Bahrain, Qatar and Trucial States | 167,348 | 293,536 | 344,250 |
| Kuwait | 186,135 | 550,849 | 596,565 |
| India | 1,763,952 | 4,919,565 | 4,898,595 |
| Pakistan | 233,677 | 848,119 | 816,287 |
| Singapore | 279,893 | 981,733 | 841,612 |
| Federation of Malaya | 255,870 | 920,538 | 860,998 |
| Ceylon | 205,978 | 384,938 | 622,204 |
| British North Borneo | 28,644 | 67,062 | 62,027 |
| Sarawak | 40,825 | 57,146 | 61,302 |
| Hong Kong | 374,792 | 914,465 | 1,105,556 |
| Australia | 1,472,987 | 5,157,012 | 4,207,735 |
| New Zealand | 859,802 | 3,985,916 | 2,590,610 |
| Fiji | 21,844 | 91,541 | 104,497 |
| Canada | 890,372 | 2,763,065 | 2,404,155 |
| Jamaica | 148,569 | 407,610 | 409,224 |
| Barbados | 33,503 | 91,670 | 109,626 |
| Trinidad | 101,558 | 367,004 | 328,478 |
| British Guiana | 34,781 | 124,839 | 273,623 |
| Other Commonwealth countries | 179,433 | 556,974 | 581,308 |
| Irish Republic | 223,445 | 857,663 | 848,768 |
| Soviet Union | 89,076 | 129,760 | 301,071 |
| Finland | 97,231 | 426,204 | 288,115 |
| Sweden | 553,377 | 1,379,825 | 1,581,069 |
| Norway | 174,080 | 687,888 | 588,046 |
| Denmark | 203,966 | 569,791 | 635,884 |
| Poland | 26,741 | 257,861 | 127,278 |
| Western Germany | 703,631 | 672,988 | 1,464,950 |
| Netherlands | 671,408 | 1,838,182 | 2,063,393 |
| Belgium | 289,594 | 921,505 | 1,119,911 |
| France | 290,974 | 1,363,219 | 888,494 |
| Switzerland | 143,960 | 417,296 | 439,321 |
| Portugal | 176,942 | 1,258,476 | 567,135 |
| Spain | 80,358 | 554,345 | 554,322 |
| Italy | 436,013 | 863,612 | 975,064 |
| Austria | 39,253 | 136,174 | 128,238 |
| Yugoslavia | 85,855 | 150,015 | 236,043 |
| Greece | 95,082 | 307,471 | 306,242 |
| Turkey | 106,970 | 335,129 | 163,688 |
| Belgian Congo | 33,345 | 117,097 | 123,458 |
| Portuguese East Africa | 19,989 | 74,018 | 52,901 |
| Egypt | 124,601 | 314,691 | 660,713 |
| Libya | 56,024 | 157,206 | 269,090 |
| Morocco (excluding Tangier) | 52,881 | 78,994 | 157,126 |
| Sudan | 77,418 | 246,719 | 272,446 |
| Syria | 19,045 | 66,046 | 56,428 |
| Lebanon | 77,040 | 208,127 | 172,599 |
| Israel | 134,929 | 226,295 | 302,413 |
| Jordan | 177,134 | 282,108 | 285,890 |
| Saudi Arabia | 27,880 | 265,142 | 151,684 |
| Iraq | 442,780 | 907,702 | 1,160,453 |
| Iran | 337,416 | 957,483 | 1,022,114 |
| Burma | 35,484 | 238,842 | 292,569 |
| Thailand | 173,396 | 521,072 | 332,757 |
| Indonesia | 43,295 | 149,082 | 62,095 |
| Japan | 94,300 | 139,120 | 208,807 |
| United States of America | 758,827 | 1,848,478 | 2,448,282 |
| Cuba | 23,341 | 321,394 | 119,176 |
| Mexico | 30,738 | 156,083 | 113,881 |
| Colombia | 18,126 | 155,551 | 85,812 |
| Venezuela | 382,792 | 1,175,252 | 1,118,224 |
| Peru | 15,855 | 117,588 | 59,181 |
| Chile | 138,598 | 96,656 | 398,682 |
| Brazil | 26,665 | 325,623 | 127,412 |
| Uruguay | 9,544 | 11,873 | 35,166 |
| Argentine Republic | 173,085 | 834,575 | 365,741 |
| Other foreign countries | 680,824 | 997,195 | 1,463,461 |
| TOTAL | 19,160,549 | 57,967,697 | 55,775,519 |

**TABLE 3.—SOURCES OF ELECTRICAL IMPORTS**

| Country | Month of March, 1959 | Three months ended 31st March, 1958 | Three months ended 31st March, 1959 |
|---|---|---|---|
| | £ | £ | £ |
| Australia | 37,606 | 155,264 | 131,868 |
| Canada | 63,726 | 231,369 | 205,116 |
| Other Commonwealth countries | 90,419 | 299,409 | 288,805 |
| Irish Republic | 68,034 | 226,056 | 239,262 |
| Sweden | 139,967 | 296,821 | 346,667 |
| Denmark | 60,029 | 153,067 | 154,369 |
| Western Germany | 545,848 | 1,298,313 | 1,556,413 |
| Netherlands | 437,479 | 1,090,578 | 1,361,714 |
| Belgium | 24,867 | 150,571 | 124,283 |
| France | 178,567 | 355,526 | 408,107 |
| Switzerland | 132,238 | 333,982 | 330,312 |
| Italy | 67,287 | 152,573 | 223,964 |
| United States of America | 773,726 | 1,789,916 | 2,380,602 |
| Other foreign countries | 152,584 | 328,181 | 398,700 |
| TOTAL | 2,772,377 | 6,861,626 | 8,150,182 |

to Canada and the other main Commonwealth markets were lower than a year ago, as were those to Latin America and other primary producing countries. There were, however, increases to certain Middle East countries.

The increase in electrical exports in March was largely accounted for by a rise of £1 million in shipments of radio and electronic apparatus. Of the other main classes of equipment the only increase, and that slight, was in converting machinery. There were, however, significant rises in the exports of certain types of batteries, lamps and domestic appliances.

The leading market for generating sets and motors was again India (£374,556), followed by South Africa (£292,376) and Australia (£221,658). Converting machinery, transformers and rectifiers went mainly to India (£343,244), Australia (£302,906), South Africa (£289,861) and Rhodesia and Nyasaland (£286,878).

Western Germany (£467,565) was the largest market for radio and electronic apparatus, followed by the Netherlands (£381,060) and India (£290,997). The largest shipments of telephone and telegraph apparatus were to New Zealand (£273,088) and Australia (£229,734), and of wires and cables to India (£222,974) and Singapore (£102,054).

Imports of electrical goods in March were £2·8 million, against £2·6 million in February, and this was slightly below the level in the fourth quarter of 1958. In the first three months of 1959 electrical imports were 19 per cent higher than in the corresponding period of last year.

**TABLE 4.—OTHER ELECTRICAL AND ALLIED EXPORTS**

| Class | Month of March, 1959 | Three months ended 31st March, 1958 | Three months ended 31st March, 1959 |
|---|---|---|---|
| | £ | £ | £ |
| Washing machines, electrically operated: | | | |
| Not exceeding 150 lb weight | 264,831 | 1,074,128 | 750,702 |
| 150 lb to 250 lb | 38,378 | 228,702 | 124,086 |
| Parts | 66,665 | 187,671 | 245,656 |
| Electric locomotives (inc. battery types) | 474,619 | 684,328 | 1,414,689 |
| Diesel locomotives with electrical transmission | 343,998 | 455,908 | 485,171 |
| Welding electrodes: | | | |
| Ferrous | 80,480 | 289,517 | 214,512 |
| Non-ferrous | 22,322 | 88,684 | 64,818 |
| Electric conduit tubes and cased tubes | 54,239 | 182,337 | 175,348 |
| Electric carbons | 104,765 | 155,466 | 285,058 |
| Electric lighting fittings and lanterns (excl. arc lamps, searchlights and cycle lamps) | 284,972 | 1,089,954 | 825,111 |
| Electric fork-lift trucks | 76,054 | 197,820 | 248,260 |
| Steam turbines | 945,052 | 2,134,302 | 2,873,590 |
| Water turbines | 399,101 | 545,623 | 1,016,837 |

**TABLE 5.—ELECTRICAL IMPORTS**

| Class | Month of March, 1959 | Three months ended 31st March, 1958 | Three months ended 31st March, 1959 |
|---|---|---|---|
| | £ | £ | £ |
| Generators, incl. parts | 40,715 | 159,756 | 194,013 |
| Motors, incl. parts | 140,680 | 287,911 | 348,167 |
| Convertors; transformers; rectifiers* | 83,724 | 60,614 | 233,415 |
| Switchgear and switchboards (not telegraph and telephone) | 92,064 | 134,986 | 243,156 |
| Cathode ray tubes, complete | 82,567 | 205,743 | 232,648 |
| Other valves, complete* | 243,756 | 536,558 | 682,699 |
| Parts (excl. glass bulbs)* | 53,388 | 131,111 | 173,134 |
| Radio receiving sets, domestic or portable, and radio for motor vehicles | 14,813 | 52,818 | 38,100 |
| Radio communication and navigational aids, complete | 302,079 | 821,137 | 998,441 |
| Other radio and TV apparatus, parts and accessories | 264,936 | 963,917 | 940,849 |
| Apparatus for telegraphy and telephony* | 63,030 | 169,394 | 214,566 |
| Welding machinery | 51,172 | 50,037 | 111,386 |
| Cooking and heating apparatus | 115,629 | 361,210 | 371,396 |
| Magnetos, ignition, and electric appliances for aeroplanes, motor vehicles and cycles | 150,679 | 570,460 | 450,307 |
| Electro-medical apparatus (incl. X-ray apparatus) | 161,898 | 260,851 | 306,161 |
| Portable mechanical appliances, electrically operated, complete | 77,643 | 210,852 | 298,386 |
| Parts | 61,647 | 165,358 | 157,108 |
| Scientific electrical instruments (excl. telegraphic and telephonic) | 136,501 | 421,278 | 382,853 |
| Other machinery, apparatus and appliances | 635,456 | 1,297,635 | 1,773,397 |
| TOTAL | 2,772,377 | 6,861,626 | 8,150,182 |

* The figures for 1959 are not completely comparable with those for 1958.

# INDUSTRY AND THE HOUSE

## The New Factories Bill

By A. M. F. PALMER, A.M.I.E.E., M.Inst.F., M.P.

ON the same day that Mr. James Callaghan, the Labour Party's front bench colonial affairs spokesman, created a minor Parliamentary sensation by producing discarded income tax returns which he had picked up at Cardiff Docks, we moved on afterwards to consider the Factories Bill " on report " from the standing committee. This Bill is a valuable measure which will, I think, make a very real and progressive contribution to the structure of industrial legislation. Altogether, Mr. Iain Macleod, Minister of Labour and National Service, brought to the floor of the House between 60 and 70 Government amendments designed to meet points raised during the committee stage, mainly by the Opposition.

As one who served on the standing committee I would like to pay tribute here and now to Mr. Macleod and his Parliamentary Secretary, Mr. Richard Wood, who have been throughout the long and at times intricate discussions ready at every point to consider suggested improvements in the Bill. This Ministerial attitude is in keeping with the modern approach to factory law which has now passed away almost entirely from the field of active party contention. We are certainly a long step from the time when socialistic spokesmen and aristocratic social reformers in Parliament had to fight hard to obtain even the minimum of decent working conditions in the mines and factories of the Victorian era. Today it is recognised everywhere that safe and healthy surroundings in industrial plants are a positive aid to their effective management. Hence, differences of opinion have not been so much on principles as on practical and legal feasibility.

### Maintenance of Steam Boilers

Among the amendments brought forward on the day in question by the Minister was one in keeping with his assurance that he would look again at the clause affecting steam boilers. Those who have taken the trouble to study the Bill will know that the Minister proposes to transfer some of the more detailed present statutory requirements from the Act itself to regulations yet to be made. The 1937 Act took over from previous legislation the requirement that a boiler must be always re-tested, apart altogether from the prescribed fourteen-month interval, whenever *extensive* repairs were carried out to it. It was pointed out in committee that this term, if carried forward into the new legislation, was vague and an attempt might be made to find a more precise expression. Reporting back to the House, the Parliamentary Secretary said that the Government was prepared now to attempt a better definition not in the Bill but in the proposed regulations arising from it.

The writer stated that he appreciated the helpfulness of the Government but also thought he voiced the regrets of many honourable members that the apparent trend of the whole of factory legislation was to take more and more provisions away from the statute and leave them to Ministerial delegation. For boilers, of course, the nature of the coming regulations now depends on the report of the Honeyman Committee which is still sitting. In the meantime Ministers retain, in effect, the powers they have enjoyed during and since the war years to make variations at discretion in the statutory inspection interval.

A further interesting change proposed by the Bill is that washing facilities in a factory must include a supply of both hot and cold water. It came as a surprise, I think, to many on both sides of the House that there was still in British factory law no precise provision compelling employers to provide hot water in industrial washing places. Because so many up-to-date factories supply hot water, and much more, as a matter of course, one overlooks that this may not be the case in plenty of small establishments and the typical factory is small and not large.

### Fire Precautions

Then Mr. Wood moved a series of amendments to transfer from district councils to the county fire authorities the power to issue fire escape certificates in works. He argued that the change implied no dissatisfaction with the manner in which small local authorities had done the job in the past but it was a fire job and should be in the hands of the larger county fire authorities, which had the experts. Effective fire precautions were no longer a question for amateurs; the genuine professionals must take over.

However, several honourable members, including such diverse figures as Sir Cyril Black (Conservative) and Mr. Sidney Silverman (Labour), deplored the taking once again of powers from bodies under the control of town and district electors and transferring them to remote authorities. Mr. Silverman said unless there were decisive or conclusive considerations which made it necessary any decision to take away functions from local authorities should be looked at with extreme care. However, Mr. Reader Harris, a Conservative who sits for Isleworth, and knows a great deal about fire fighting, retorted that the reason which Mr. Silverman sought was that at the time of the unfortunate Keighley fire less than half the factories in the country had been certified according to the present procedure. In his view he was supported warmly by Mr. Alfred Robens, officially on behalf of the Opposition, who said bluntly that the proposed amendment should command the respect of any sensible person who was not pursuing a vested interest on behalf of district councils. The paramount consideration was the safety of seven to eight million workers.

A debated suggestion was one under which the Minister would, by special regulations, prescribe that any factory employing more than one hundred workers on any shift should include canteen facilities good enough to provide hot beverages and cooked food. The suggestion on this occasion came from Mr. Ellis Smith, a highly respected Labour back bencher. Mr. Smith's speech was supported by Mr. Nabarro who is, among other useful attributes, an experienced employer. He contended that the mess rooms required by the Ministry under present arrangements were often unsatisfactory places. They were too frequently nothing more than a resort where men and women employed in the factory

could go with "thermos flasks and mugs to pour themselves a hot drink and eat their sandwiches." He could not regard this as adequate. It reflected no credit on those industrialists who were prepared to let it go on. But fellow employer, Mr. Frederick Harris, Conservative member for Croydon North West, disagreed with Mr. Nabarro. It would not be lost on the House, he thought, that the cost of providing the proposed canteen facilities, particularly for small concerns, would be very high. Factory meals usually meant a subsidy from the employer if the price was to be kept at such a level that the workers would in fact buy the meals provided. Often, he argued, canteen facilities—even of the best—were not used by employees because their homes were near or because other facilities of a more varied nature were within easy distance. Then the canteen became a tremendous expense, catering for only a small number. The factory inspectorate could already require proper facilities to be provided in cases where there was no alternative. Mr. Harris said he had always found the inspectors most enlightened in these things; he was in favour of leaving the decision with them.

Replying for the Government, the Parliamentary Secretary assured the House that he and his Minister had considered the arguments used very carefully. To set up a numerical standard would inevitably be extremely hard on the employer who had already established good facilities for eating but in whose factory the majority of workers would not use a canteen, even if one was opened. He undertook instead to make an examination to see whether the present powers of the factory inspectorate could not be used more freely. With this assurance, and the support of the Labour front bench, Mr. Ellis Smith withdrew his suggestion which had provoked an excellent discussion.

I thought the day's debate represented Parliament at its constructive best. However, there are no exciting Press headlines to be extracted, I am afraid, from factory legislation, so most of the voters will never know.

## London "Underground" Modernisation

OVER £30 million will be spent during the next four years on the biggest modernisation scheme for the London Underground Railways since the war. This was announced by Sir John Elliot, chairman of London Transport, on 21st April when he was speaking to the L.C.C. College of Distributive Trades on means to relieve London's rush-hour and traffic congestion. The plan, he said, included the renewal of over a third of the Underground trains. The new trains, numbering 200, would be in the new "silver" finish.

On the Piccadilly Line £10 million would be spent on 76 new trains to re-equip the line completely and give one-seventh more passenger carrying capacity. Delivery of the trains would start this year. On the Metropolitan Line there would be 31 new trains for the Amersham-Chesham-Watford services with delivery starting next year, electrification of the 10-mile Rickmansworth-Amersham-Chesham section, and doubling of the overloaded seven-mile Harrow-Moor Park section. The programme, to be completed in three years, would cost £9 million and would increase the carrying capacity of the combined London Transport-British Railways services to stations north of Harrow by over a quarter and would give greater regularity and faster services. Central Line improvements, costing £9 million, included 87 trains made up of new and completely rebuilt cars in equal numbers. Test trains would be running early next year and the main delivery would start in 1962. The new trains, combined with the lengthening of all trains to eight cars early next year, would give the line nearly 25 per cent additional passenger capacity. A sum of £2½ million was being spent on improving the 12-mile Bow-Upminster section of the District Line, in addition to the work being carried out by British Railways to eliminate track crossings at Barking. New cars to lengthen all Circle Line trains from five cars to six cars would cost £300,000. In addition, the "Underground" power distribution system was being modernised at a cost of over £2 million.

In his speech Sir John Elliot also dealt with the effect of changing social habits, rush-hour travel and traffic congestion on both public transport and the distributive trades.

## Refrigerators and Food Freezers

TWO British Standards for electric refrigerators and food freezers for household use are now combined in a single new and revised publication. They are B.S. 922, which covers the requirements for all climates, and B.S. 1691, dealing with temperate climates only. Two upper limits of test temperature, 90 deg F for temperate climates and 110 deg F for all climates, are now specified in the combined version. Modern design practice and the latest refrigeration techniques are embodied in this revision, and refrigerators or food freezers built to its provisions should thus have a high standard of performance and be of consistently good quality.

Advantage has been taken in the revision to limit the permissible refrigerants to those known to be satisfactory and in general use. Some alterations have been made to the methods of computation of shelf area and storage volumes. Construction of both the cabinet and the refrigerating system is specified, and detailed requirements for the electrical components are given. There are production tests for each appliance and certain type tests for assessing performance.

Copies of B.S. 922 and 1691:1959, may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1, price 7s 6d.

## A.S.E.E. Conference

THE Mayor of Folkestone is to open the conference of the Association of Supervising Electrical Engineers which is being held at Folkestone from 8th to 10th May and the informal part of the proceedings will include an address by the chairman of the Association, the showing of the A.S.E.E. newsreel film and the conferring of Fellowship of the Association upon Mr. L. L. Emmett, of Leeds.

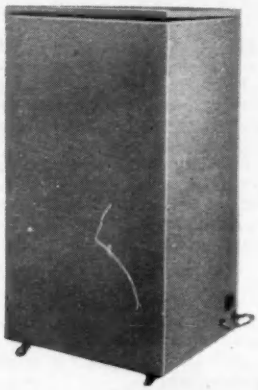
During the business sessions delegates of 40 branches, and other members, will receive the report of the Council. Motions relating to electricity charges, earthing, redundancy in industry, Electrical Industry Approvals Board, examinations, and others concerning A.S.E.E. domestic matters, will be debated.

The programme of social events will include a reception by the Folkestone Corporation, followed by dancing; a special demonstration of cooking, in the French fashion, given by Mrs. M. E. Pickford, B.A., head of the E.A.W. Housecraft Department; a circular tour by motor coach; and a dinner-dance at the Hotel Metropole, the conference headquarters.

# NEW ELECTRICAL EQUIPMENT

## Clothes Drying Cabinet

The "Drierway" electrically heated drying cabinet available from METWAY ELECTRICAL INDUSTRIES, LTD., Canning Street, Brighton, 7, although designed for drying clothes may also be used as an airing cupboard or convector heater.



*Metway "Drierway" clothes drying cabinet*

The total loading is 1,250 W, with switch for half-heat, and the base is so constructed that damage to the elements from wet or dripping clothes is prevented. The finish is in white stoved enamel and castors are fitted for ease of movement. It measures 36in high by 19½in wide by 16in deep and is supplied with a wire tray and 6ft of 3-core flexible. The price is £9 15s plus £2 2s 3d purchase tax.

## Cable Tracer

A compact, pocket-size instrument to detect and locate open or short circuit faults in concealed cables and wiring, manufactured by Metrawatt A. G., Nürnberg, is now being

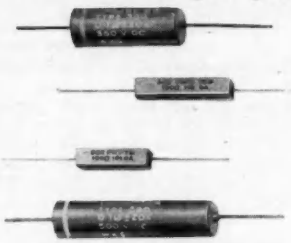
*Metrawatt cable tracer*

marketed in this country by METRIX INSTRUMENTS, LTD., 54, Victoria Road, Surbiton, Surrey. A transistorised amplifier detects either the conductor voltage or the current flowing when the instrument is placed in the vicinity of the wiring under investigation. Indication is given on a meter or in headphones which may be plugged into the sockets provided. The instrument, which has a plastic case and a shock-proof meter, has overall dimensions of 3in by 4in by 1in, and weighs only 7 oz.

## Capacitors and Resistors

Two ranges of components have recently been announced by the DUBILIER CONDENSER CO. (1925), LTD., Ducon Works, Victoria Road, North Acton, W.3. The type 560 series of paper dielectric tubular capacitors, having capacitances from 0·001 to 0·1 μF with a standard tolerance of ±20 per cent or, by selection, ±10 per cent, are suitable for operation in ambient temperatures between −40 and +125 deg C on d.c. voltage applications and −40 to +70 deg C on a.c. voltage applications. The paper and foil element is impregnated with a high temperature plastic material, the wire terminations are soldered on and the completed element is then encapsulated in a mineral loaded epoxy resin having high resistance to shock and moisture.

Three wire-wound high temperature



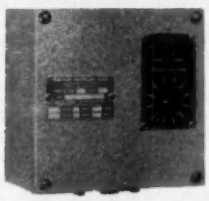
*Dubilier capacitors and resistors*

resistors rated at 5, 7 and 10 W have also been introduced. The type PW-5, PW-7 and PW-10 resistors comprise a uniformly spaced wire wound on a silicone processed glass fibre core, housed and sealed in a rectangular section ceramic case. The resistance values for the three types range from 0·5 Ω to 2 kΩ, 0·5 Ω to 6·5 kΩ and 1 Ω to 10 kΩ respectively, with a tolerance down to ±5 per cent, and a change in value of less than 2 per cent after carrying three times normal load for 5 seconds.

## Time Delay Unit

An electronic time delay unit of their own design is incorporated in the electric motor control gear for industrial or other timing applications manufactured by BROOK MOTORS, LTD., Empress Works, Huddersfield. It is suitable for use with start-to-run motor switching on hand-operated starters, slip-ring automatic starters, motor braking periods, sequence starting and stopping, and process control timing. The infinitely variable time delay setting is obtained by using a "coarse" control switch in conjunction with a variable rotary sliding resistance to give fine adjustment.

The standard models available, which are suitable for operation from 200/250 or 380/440 V supplies, have a minimum delay time of approximately 0·75 sec and maximum times varying from 7·5 sec to 4·5 min. The overall size is 6¼in by 6¼in by 3¼in, though the unit is available without its



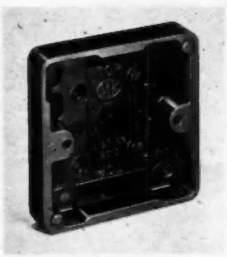
*Brook time delay unit*

sheet metal box housing for mounting in a manufacturer's own enclosure.

Non-standard features available include facilities to accept other supply voltages, between 100 and 650 V a.c. or 200 and 650 V d.c., and special contact arrangements, including two normally open, two normally closed sets of contacts, or one normally open and one normally closed contact. Heavy duty contacts, 3 A a.c. or 1·5 A d.c., can be incorporated if required.

## Mounting Box

A new moulded mounting box (List No. 2010) has been announced by M.K. ELECTRIC, LTD., Wakefield Street, London, N.18. It has been designed to allow one- and two-gang plaster-depth plateswitches to be



*M.K. mounting box for plateswitches*

mounted as surface types. The box is now in production and the list price, per dozen, is 12s (brown) and 14s (ivory).

# GENERATION and DEVELOPMENT

### *Lower Output in March*

For the first time since the early part of 1958 the Ministry of Power's monthly return of electricity generated shows a fall in output compared with the corresponding month of the previous year. In March a total of 9,124 million kWh was generated by the Central Electricity Generating Board, the South of Scotland Electricity Board and the North of Scotland Hydro-Electric Board, a decrease of 3·4 per cent. This is less significant than it appears, however, for comparison between the two months is upset by the earlier occurrence of Easter this year, resulting in reduced industrial supplies. Furthermore, the warmer weather in March last must have had an appreciable influence on the heating demand; weekly average temperatures ranged from 3·6 to 10·7 per cent above those recorded a year ago, according to figures published by the Ministry. The Electricity Council, in its statement on Area Boards' sales, estimates that, when corrected for weather conditions and the number of working days, the national output represents an effective increase of 8·4 per cent.

As will be seen from the analysis of Boards' sales, the reductions ranged from 0·7 per cent (East Midlands) to 7·3 per cent (London), the Southern area, where there was an increase of 0·2 per cent, being the only exception.

In the South of Scotland area the total supplies amounted to 636·9 million kWh, a decrease of 0·7 per cent. Of this, 54·4 million kWh was imported from the C.E.G.B., 38·1 million kWh from the North of Scotland Board and 21·1 million kWh from the United Kingdom Atomic Energy Authority's Chapelcross nuclear power station. Imports from the C.E.G.B. were 15·2 per cent less than a year ago and those from the North of Scotland Board 14·6 per cent more. Area requirements of the North of Scotland Board totalled 143·5 million kWh, a decrease of 6·9 per cent.

At the end of March the aggregate capacity of plant installed was 28,078 MW. This included a new 60 MW Parsons set and a 550 klb/hr Foster Wheeler boiler commissioned during the month at Little Barford "B" power station.

In addition to public supplies, 1,059 million kWh was generated by industry in the five weeks ended 4th April last, a decrease of 2·6 per cent compared with the corresponding period of 1958. The reductions in individual industries were mostly greater than this (e.g. 19·4 per cent in the case of engineering) but were partly offset by increased supplies from nuclear power stations, which rose from 34 million to 98 million kWh.

### *New Drakelow Station*

The C.E.G.B. has received the consent of the Minister of Power to the erection of the largest power station yet projected in the British Isles. It will be constructed at Drakelow, near Burton-upon-Trent, and will have a total output capacity of approximately 1,500 MW. The Drakelow site is on the fringe of the East Midlands coalfield which is a major source of the low-grade coals used in the production of electricity. Here, a 240 MW station, Drakelow "A," was commissioned in 1954 and a second station, Drakelow "B," with a capacity of 480 MW is being built. The new station will be known as Drakelow "C."

The site is at a focal point of the 275 kV supergrid system, and the output of the new station can be fed into the system without the construction of additional overhead transmission lines. The steam conditions and size of the boilers and generating units to be installed have yet to be determined and will depend on technical developments in boiler and turbo-alternator design.

### *Elstree-Finchley 275 kV Line*

Application has been made by the C.E.G.B. for consent to the erection of an overhead grid line 7½ miles long between an existing substation near Elstree and a proposed new substation at Burtonhole Lane, near Mill Hill. It will be designed for operation at 275 kV.

The proposed line, which is urgently required to meet the ever-growing demand in the area, was the subject of applications made last year to the local authorities and local planning authorities affected, several of whom have strongly opposed it. The Board has considered the objections put forward but has been unable to find any way of overcoming them at a cost which would be justified. It will be necessary for a public inquiry to be held at which objections can be heard.

### *Smoke Control in Glasgow*

The Glasgow Central Smoke Control Area Order, 1958, was confirmed on 17th April by Mr. John S. Maclay, Secretary of State for Scotland, and will come into force on 15th October. It covers an area of 201 acres, within which there are 4,367 premises, including 420 industrial, 3,546 commercial

**ELECTRICITY GENERATED AND SENT OUT FOR PUBLIC SUPPLY**

| | Fuel consumed Thousand tons | | | Electricity generated Million kWh | | | Electricity sent out Million kWh | Installed capacity (m.c.r.) MW |
|---|---|---|---|---|---|---|---|---|
| | Coal | Coke and Breeze | Oil | Steam | Water power | Total | | |
| Central Electricity G.B. ... | 3,671 | 92 | 339·4 | 8,366 | 6 | 8,377 | 7,877 | 25,409 |
| North of Scotland H.E.B. ... | 10 | — | 1·4 | 16 | 170 | 192 | 191 | 1,011 |
| South of Scotland E.B. ... ... | 284 | 5 | 0·5 | 531 | 24 | 555 | 523 | 1,658 |
| Total for March, 1959 ... ... | 3,965 | 97 | 341·3 | 8,913 | 200 | *9,124 | 8,591 | 28,078 |
| Corres. total for March, 1958... | 4,571 | 93 | 133·7 | 9,235 | 197 | 9,448 | 8,900 | 26,734 |
| Inc. or dec., per cent ... ... | −13·3 | +3·7 | +155·3 | −3·5 | +1·8 | −3·4 | −3·5 | +5·0 |
| Total to date (3 months), 1959... | 13,187 | 318 | 1,063·0 | 29,073 | 610 | 29,725 | 28,028 | |
| Total for corres. 3 months of 1958 | 13,703 | 284 | 381·3 | 27,502 | 699 | 28,250 | 26,621 | |
| Inc. or dec., per cent ... ... | −3·8 | +12·0 | +178·8 | +5·7 | −12·6 | +5·2 | +5·3 | |

* The total figure includes generation by other methods amounting to 11 million kWh.

**ELECTRICITY SENT OUT BY BOARDS FOR THEIR CONSUMERS**

| Area Board | Totals for March (million kWh) | | | Twelve Months Totals Ended 31st March, (million kWh) | | |
|---|---|---|---|---|---|---|
| | 1958 | 1959 | Inc. or Dec. % | 1957/8 | 1958/9 | Inc. or Dec. % |
| London ... ... ... ... | 795·7 | 737·8 | −7·3 | 7,442·7 | 7,813·3 | + 5·0 |
| South Eastern ... ... ... | 511·4 | 485·3 | −5·1 | 4,866·4 | 5,323·1 | + 9·4 |
| Southern ... ... ... ... | 632·3 | 633·6 | +0·2 | 6,119·5 | 6,814·0 | +11·3 |
| South Western ... ... ... | 305·8 | 303·4 | −0·8 | 2,989·7 | 3,250·4 | + 8·7 |
| Eastern ... ... ... ... | 803·4 | 774·4 | −3·6 | 7,839·8 | 8,385·1 | + 7·0 |
| East Midlands* ... ... ... | 644·0 | 639·2 | −0·7 | 6,575·1 | 6,959·8 | + 5·9 |
| Midlands* ... ... ... ... | 863·4 | 842·0 | −2·5 | 8,496·7 | 9,041·4 | + 6·4 |
| South Wales* ... ... ... | 467·4 | 460·6 | −1·5 | 4,903·6 | 5,112·1 | + 4·3 |
| Merseyside and N. Wales* ... | 498·8 | 485·1 | −2·7 | 5,152·4 | 5,418·5 | + 5·2 |
| Yorkshire* ... ... ... ... | 830·3 | 783·9 | −5·6 | 8,549·6 | 8,666·9 | + 1·4 |
| North Eastern* ... ... ... | 480·7 | 463·8 | −3·5 | 4,977·8 | 5,107·3 | + 2·6 |
| North Western* ... ... ... | 843·9 | 793·4 | −6·0 | 8,788·8 | 9,024·8 | + 2·7 |
| Total all Area Boards ... ... | 7,677·1 | 7,402·5 | −3·6 | 76,702·1 | 80,916·7 | + 5·5 |
| Direct Supplies by C.E.G.B. ... | 247·5 | 269·2 | +8·8 | 2,583·2 | 3,053·9 | +18·2 |
| Grand Total ... ... ... | 7,924·6 | 7,671·7 | −3·2 | 79,285·3 | 83,970·6 | + 5·9 |
| Mainly Industrial Areas* ... ... | 4,628·5 | 4,468·0 | −3·5 | 47,444·0 | 49,330·8 | + 4·0 |
| Mainly Non-Industrial Areas ... | 3,048·6 | 2,934·5 | −3·7 | 29,258·1 | 31,585·9 | + 8·0 |
| South of Scotland E.B. ... ... | 641·3 | 636·9 | −0·7 | 6,369·1 | 6,781·0 | + 6·5 |
| North of Scotland H.E.B. ... | 154·2 | 143·5 | −6·9 | 1,473·8 | 1,555·1 | + 5·5 |

* Those in which industrial consumers took over 50% of the total sales in the preceding financial year.

and 367 domestic. This will be Scotland's first smoke control area in the centre of a town or city. Edinburgh already has a smoke control area at Sighthill, in the suburbs. In Dundee the Menziehill area will be smoke-controlled from 1st October.

### *Nuclear Power Exhibition*

An exhibition emphasising the ever-growing demand for electrical power in Britain and showing how the demand will be partly met by nuclear power stations is to be organised by the Central Electricity Generating Board at Stokefield House, Thornbury, Gloucestershire. It is to be staged in connection with the Board's application to build a nuclear power station at nearby Oldbury-on-Severn and the investigations of three other areas on the Severn Estuary which are to be made to determine whether they are suitable for nuclear power station development, Tidenham, Aust and Portskewett.

The exhibition will be opened by Sir Algar Howard, Deputy Lieutenant of Gloucestershire, on Monday next, and from Tuesday to Saturday, inclusive, the exhibition will be open to the public from 10 a.m. to 7 p.m. A number of models will show nuclear power stations now being built, and the principles of nuclear power production will be illustrated by an animated diagram of a typical nuclear reactor. A cinema will be associated with the exhibition and appropriate films will be shown.

### *High Post-Budget Sales*

Record sales of electrical appliances in the week following the announcement of the Budget reductions in purchase tax are reported by the North Western Electricity Board. Curiously enough, electric cookers, which do not carry purchase tax, were also in greater demand, sales rising by 28 per cent.

The largest increase was in refrigerators, over five times as many being sold in the week after the Budget (469) as in the week before (80). The latter figure, the Board states, has been typical of the weekly out-of-season average sales over the past three months. Other noteworthy increases were: washing machines from 209 to 973 and vacuum cleaners from 367 to 653. Nearly three times as many spin dryers and over twice as many dryers of other types were sold. There were also considerable increases in sales of immersion heaters and even electric fires and space heaters, which normally show a falling-off in sales during the spring, were in greater demand.

This post-Budget spurt accentuates the recent rapid increase in the Board's sales of electrical appliances. During the year ended 31st March the Board disposed of 36,000 cookers, 30,000 water heaters, 25,000 vacuum cleaners, 25,000 space heaters, over 20,000 washing machines, 13,000 clothes dryers and 9,600 refrigerators. Compared with the previous year, sales of refrigerators were 85 per cent, washing machines 38 per cent and cookers 25 per cent higher. Final figures for the value of appliances sold are not yet available but it is anticipated that the total will be of the order of £5·3 million compared with £4·2 million in 1957-58.

### *Hydro-Electric Plant Contracts*

The North of Scotland Hydro-Electric Board has placed contracts for further generating plant for its Strathfarrar and Kilmorack scheme in Inverness-shire. This scheme, which will produce 268 million kWh annually, will have four power stations, two on the River Farrar and two on the River Beauly. The contract for the plant in the two Beauly stations was announced recently.

The Board has now placed with the English Electric Co., Ltd., the contract to provide and install the generating plant at the Culligran power station in lower Glen Strathfarrar. The plant in this station, which will consist of a 30,500 h.p. Kaplan turbine driving a 22 MW generator, will be made at Harland & Wolff's Scotstoun engineering works, Glasgow. At the Deanie power station, six miles further up the Glen, the plant will consist of two 26,600 h.p. vertical-shaft Francis turbines, each driving a 19 MW generator. The contract to manufacture and supply these sets has been placed with the English Electric Co., who will manufacture the generators at Scotstoun while the turbines will be made by the Harland Engineering Co., Ltd., Alloa, as sub-contractors. The electrical and mechanical consultants for the Strathfarrar and Kilmorack scheme are Messrs. Kennedy & Donkin, Edinburgh.

## *Parliamentary Report*

### Manufacture of Nuclear Fuel Elements

An announcement that it was intended that Rolls-Royce, Ltd., should manufacture fuel elements for nuclear submarine machinery was made in the House of Commons by the Prime Minister last week, following a flare-up on the previous day during the committee proceedings on the Nuclear Installations (Licensing and Insurance) Bill. Opposition members were then so annoyed at what they described as "a disclosure" by Sir Ian Horobin, Parliamentary Secretary, Ministry of Power, that private firms were making, or about to make, nuclear fuel elements, and his subsequent failure to amplify this statement, that they decided to question the Prime Minister.

In reply, Mr. Macmillan said Sir Ian had naturally been unwilling to go into greater detail until he had been able to refer to the defence authorities whether any question of security arose. "I have considered this matter," he said, "and see no objection to stating that it is the intention that Rolls-Royce, Ltd., should manufacture fuel elements for nuclear submarine machinery. The material will be supplied by and will remain the property of the Admiralty."

Mr. Robens said it had been a cardinal policy that nuclear fuel was manufactured and owned entirely by the State. Would the Prime Minister say on what terms any company was able to obtain uranium from the Government and make nuclear fuel elements?

Mr. Macmillan said the object of the Bill, which was still under consideration, was to provide for the future, now that we were entering the atomic age. At present all material was manufactured by the Atomic Energy Authority, and remained, in the particular instance he had given, or in others, the property of the Authority or the defence departments.

Mr. Gaitskell asked whether it was intended that nuclear fuel elements should be manufactured on a large scale, in many cases by other firms.

Mr. Macmillan replied that, as a matter of practical fact, it was probable that there would be a certain amount of processing. Manufacture called for enormous investment and plant at the present stage, but the purpose of the Bill was to make clear that, whatever might be the developments over the next 20 or 30 years, the proper system of licensing and control would be enforced if it should ever arise that processing or manufacture was to be done by private enterprise.

It was when the Opposition was moving an amendment in committee that a nuclear site licence should not be granted to any person other than a statutory undertaking or research organisation to be approved by the Minister that the discord arose.

Sir Ian Horobin, replying, said it was a misconceived attempt to limit the country's effort in this field. The amendment, or anything like it, would have effect over all the types of use, storage, treatment and development of these atomic substances.

### Power Stations and Agriculture

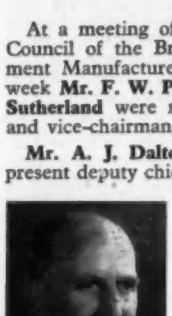
Mr. Loveys said the Central Electricity Generating Board was considering taking first-class agricultural land near Chichester for the purpose of a power station, and asked what the Government's policy was in regard to the use of such land for this purpose. Mr. Maudling, Paymaster General, said it was the Government's policy to ensure that good agricultural land was not taken for development where less good land would serve the purpose.

# PERSONAL AND SOCIAL

## *News of Men and Women of the Industry*

At a meeting of the newly elected Council of the British Radio Equipment Manufacturers' Association last week **Mr. F. W. Perks** and **Mr. A. L. Sutherland** were re-elected chairman and vice-chairman, respectively.

**Mr. A. J. Dalton,** A.M.I.E.E., the present deputy chief commercial engineer, has been appointed chief commercial engineer to the South Wales Electricity Board in succession to the late Mr. J. F. Smith.



*Mr. A. J. Dalton*

Mr. Dalton joined the staff of the Board at its inception in 1948, in charge of the low voltage supplies section of the Commercial Department at head office and has been deputy chief commercial engineer since 1956. He has been connected with the electricity supply industry in South Wales since 1936 when he was appointed electrical engineer and manager to the former Electricity Department of the Milford Haven Urban District Council.

**Mr. H. Jackson,** B.Sc.(Eng.) (London), M.I.E.E., M.I.Mech.E., has been appointed deputy chief commercial engineer to the South Wales Electricity Board in succession to Mr. Dalton. Mr. Jackson, who has been connected with the electricity supply industry in South Wales for nearly thirty years has been in charge of the industrial supplies section of the Commercial Department at head office since March, 1955. Before vesting date he was electrical engineer and manager to the Cardiff Rural District Council and in 1948 he was appointed district commercial manager of the Cardiff and West District, a position he held until April, 1953, when he became senior commercial assistant (industrial supplies) for the Board's Cardiff and East Central Area. Two years later he became industrial supplies engineer at the Board's head office.

**Mr. E. T. Harrington** has relinquished his position as advertising manager of the Hoffmann Manufacturing Co., Ltd., for health reasons, but is remaining in the Advertising Department. He is succeeded as advertising manager by **Mr. M. H. Cobbold.**

A presentation was made on 17th April at Seacoal House, Seacoal Lane, E.C.4, to **Mr. F. Judge,** assistant chief accountant, North London Group, of the London Electricity Board, who retired from the service of the Board after twenty-eight years in the industry. Mr. Judge joined the former City of London Electric Lighting Co. in 1931 as the chief accountant and on nationalisation was appointed northern sub-area accountant. The presentation was made by Mr. D. B. Irving, chairman of the Board.

**Mr. R. J. Prebble** has taken up the appointment of senior engineer of Mortimer, Gall & Co., Ltd. For the past twenty-two years he has been associated with the industry through D. Napier & Sons, Ltd., and with E. Wingfield Bowles & Partners and Oscar Faber & Partners, electrical consulting engineers.

**Mr. R. J. Shawyer,** Graduate I.E.E., has been appointed a director of Polypenco, Ltd., in addition to his position as sales manager of the company.

**Mr. J. S. Warren** has been appointed sales promotion manager of the radio and electrical group of Brown Brothers, Ltd. During his many years in the electrical industry Mr. Warren has had close connections with radio and electrical manufacturers, wholesalers and retailers throughout the country.

*Mr. J. S. Warren*

The M.O. Valve Co., Ltd., a subsidiary of the General Electric Co., Ltd., announces that **Mr. F. T. C. Dixon** has been seconded to the company's agents in North America (the British Industries Corporation of New York) as part of a drive to expand sales of M.O. valves and cathode ray tubes throughout the North American continent. Mr. Dixon was previously in charge of cathode ray tube sales at the company's Hammersmith Works. His place in London is taken by **Mr. M. Sherry,** who was previously a development engineer at the G.E.C.'s Valve Research Laboratories, Wembley.

**Mr. P. T. Thornhill,** B.Sc.Tech., A.M.I.E.E., has been appointed assistant chief engineer (contracts), Switchgear Department, of the Metropolitan - Vickers Electrical Co.

*Mr. P. T. Thornhill*

Mr. Thornhill received his technical education at Manchester University and joined the company in 1928 as a college apprentice. Following his apprenticeship he held various positions in the Switchgear Department. He has represented the company on a number of B.E.A.M.A., B.S.I. and E.R.A. Sub-Committees.

**Mr. P. J. A. Lubbock,** M.I.A.M.A., publicity manager of Dewhurst & Partner, Ltd., has taken up the position of advertising executive with Evershed & Vignoles, Ltd.

**Mr. F. Gregory,** until recently dealer liaison manager of Hoover, Ltd., with the Merseyside and North Wales Electricity Board, has retired, and presentations have been made to him on behalf of the directors and his colleagues.

**Mr. R. Gilliver,** for twenty-seven years liaison manager of Hoover, Ltd., with the London departmental stores, and who has been with the company

*At the A.S.E.E. Southampton Branch social evening, held on 23rd April. Left to right: Mr. H. E. White (commercial officer, S.E.B.), Mrs. White, Mr. A. J. Pearson (branch chairman), Mrs. Pearson, Mr. E. A. Bromfield (A.S.E.E. secretary) and Mrs. Bromfield*

since 1921, retired recently. At an informal party held in his honour he was presented with a canteen of cutlery from the directors of the company, and with other gifts from his colleagues and his many friends in the London stores themselves.

**Mr. R. E. Hesketh,** who recently retired from the General Electric Co., Ltd., is now associated with the Studio Irwin organisation, 118, Chancery Lane, London, W.C.2, in a publicity consultative capacity.

The Bristol Branch of the **Electrical Industries Benevolent Association** has established its Taunton area as a separate branch of the Association and the following officers have been appointed:—Chairman, Mr. A. R. Stowell (Quantock Electric Co., Ltd.); vice-chairman, Mr. C. T. Barker (South Western Electricity Board); hon. secretary, Mr. D. Hustwick; and hon. treasurer, Mr. C. J. Harbud (both of S.W.E.B., Taunton).

Mr. A. Dryburgh, A.A.C.C.A., A.C.W.A., Glasgow district accountant, South of Scotland Electricity Board, has been appointed hon. treasurer of the Glasgow Branch of the E.I.B.A.

The Minister of Transport and Civil Aviation has appointed **Mr. A. B. B. Valentine** to be chairman of the London Transport Executive, in succession to **Sir John Elliot,** who is retiring on 30th June. Mr. Valentine's appointment will date from 1st July, 1959. Mr. Valentine will be the full-time chairman of the London Transport Executive but he will retain a seat on the British Transport Commission.

*Mr. A. B. B. Valentine*

**Mr. A. H. Grainger,** deputy chairman of the London Transport Executive, will be appointed also managing director. In this capacity he will be responsible to Mr. Valentine for day-to-day management and the co-ordination of all executive work.

Mr. Valentine, after experience in publicity work for the British Commercial Gas Association, joined the Underground group of companies and shortly after this became an assistant in the office of the late Mr. Frank Pick, then managing director. He was Mr. Pick's personal assistant when the London Passenger Transport Board was formed and remained in that position until 1936. When the London Transport Executive was set up in 1948 he was appointed a full-time member of that body. He was president of the Institute of Transport in 1951-52.

Mr. Grainger joined the Metropolitan Railway Co. in 1914 and later qualified as a solicitor. He became a member of the London Transport Executive on its formation.

*At the recent dinner-dance of the Western Centre of the I.E.E. Mrs. H. Davidson being greeted by Mr. and Mrs. S. E. Goodall, and Mr. H. Davidson (controller, South Western Division, C.E.G.B.) being received by Mr. R. W. Steel (Centre chairman) and Mrs. Steel*

The annual luncheon of the **Institute of Fuel** was held on 23rd April at the Connaught Rooms, London. The president of the Institute, Mr. T. C. Bailey, presented the parchment of honorary membership to Mr. R. H. Gummer and the Bone-Wheeler medal and N.I.F.E.S. prize for 1958 to Mr. M. V. Murray. Mr. Bailey then proposed the toast to the guests. The response was made by Mr. C. M. Vignoles, C.B.E., president of the Institute of Petroleum and managing director of Shell-Mex & B.P., Ltd., who said it had never been suggested that oil would or should meet all the increasing demands for energy. The major refining industry created in Britain since the war was now an essential part of British industry and its productive capacity. By reducing Britain's expenditure of foreign currency and also by their exports, the refineries had made a substantial contribution towards a favourable trade balance. Last year over a third of the merchant shipping tonnage completed in U.K. shipyards consisted of oil tankers and they now accounted for over half the tonnage on order. Apart from tankers, the oil companies had spent £600 million in Britain in the past five years on the purchase of other petroleum equipment.

On the previous evening Mr. T. C. Bailey gave his presidential address to the Institute, taking as his subject "Oil Burners—1859 to 1959." He said that the design of future burners would probably achieve even finer atomising and the ability to burn oil with no more than its theoretical quantity of air.

Nearly 400 members and friends of the **B.T.H. (Willesden) Long Service Association** attended the thirteenth annual reunion at Wembley Town Hall on 23rd April. The Association, originally formed in 1931, now has a membership of 313 and this year has added twenty-nine members (employees who have served the company for twenty-five years). The principal guest of the evening was Dr. C. Dannatt, group managing director, Metropolitan-Vickers Electrical Co., Ltd. He was introduced by the Association's vice-chairman, Mr. A. Roxburgh (manager, Switchgear Engineering Department), deputising for the chairman, Mr. P. E. Gaze (manager, Switchgear Contracts), who is at present visiting Rhodesia.

**Mr. W. Percy McGeoch,** works managing director of William McGeoch & Co., Ltd., Birmingham, has recently been elected junior vice-president of the National Brassfoundry Association. He has also been re-elected hon. treasurer of that body and is chairman of the Electrical Section.

With reference to the notice regarding changes in the board of the Lindley Thompson Transformer & Service Co., Ltd., published in our last issue, the company informs us that although **Mr. J. Lindley Thompson** has resigned from the board, his services are being retained in a consultative capacity.

At the annual meeting of the Batti-Wallahs' Society held on 16th April, **Mr. J. Temple Hazell,** M.B.E. (Mil.), was elected president for 1959-60.

*Mr. J. Temple Hazell*

Mr. Temple Hazell was educated at Berkhamsted and in the 1914-18 war was with the 1st Battalion H.A.C. Infantry in Flanders in 1914, later being commissioned with the Liverpool Rifles. After a number of years with Vickers, Ltd., he joined Callender's Cable & Construction Co., Ltd., in 1927 and was personal assistant to the late Mr. P. V. Hunter from 1933 to 1952; he is now assistant to Mr. W. G. Black. Mr. Temple Hazell joined the Home Guard in 1940 and later initiated and ran a school for bombing instructors, being awarded the M.B.E.(Mil.). He has been a member of the Batti-Wallahs' Society since 1946 and for a number of years has acted as assistant hon. secretary and treasurer. He was largely instrumental in forming the

Hunter-Hazell collection of historic power cables now in the Science Museum.

**Mr. T. C. F. Bigland** was re-elected hon. secretary and treasurer of the Society at the annual meeting and **Mr. H. E. Fleetham** was elected assistant hon. secretary. The following were elected to the Committee:—Messrs. J. S. A. Bunting, M. D. Cloran, H. A. Crabtree, K. Druce, J. B. Scott and G. H. L. Smith.

The closing date for receipt of applications for the post of senior assistant engineer (planning and development) in the Monmouthshire and Mid-Wales Area of the **South Wales Electricity Board** at Cwmbran, advertised in last week's issue, has been extended to 9th May.

## OBITUARY

**Col. Sir A. Stanley Angwin,** whose death on 21st April, at the age of seventy-five, we briefly reported in our last issue, was internationally known for his work on the development of telecommunications. After serving as a pupil with Yarrow & Co., he entered the Post Office Engineering Department in 1906. When the Territorial Force was inaugurated he raised the Lowland Division Telegraph Company, which consisted almost entirely of Post Office staff, and when in 1914 it was "embodied" it was converted into the 52nd Divisional Signal Company with Major Angwin in command. He served throughout the 1914-18 war in Gallipoli, Egypt, Palestine and France, and after the war joined the wireless section of the Post Office and played a major part in the design and construction of the Leafield, Cairo and Rugby radio stations, and in the inauguration of the transatlantic telephone service. After holding various positions in the Post Office he was appointed engineer-in-chief in 1939.

*The late Col. Sir A. Stanley Angwin*

As British delegate, Sir Stanley attended many official international telecommunication conferences and he accompanied Lord Reith on a tour of the Dominions in 1945 to study and report on Commonwealth communications which led to the setting up of the Commonwealth Telecommunications Board. He relinquished his position with the Post Office in 1946 and was appointed chairman of the new board of directors of Cable & Wireless, Ltd., upon the transfer of the company's undertaking to the State, but resigned that position in March, 1951, to become chairman of the Commonwealth Telecommunications Board, from which he retired in 1956. He served as chairman of the Radio Research Board from 1947 to 1952 and he also acted as consultant and adviser on research and development to the board of Marconi's Wireless Telegraph Co., Ltd. Sir Stanley was knighted in 1941, appointed K.B.E. in 1945 and K.C.M.G. in 1957. He was president of the Institution of Electrical Engineers for 1943-44, was awarded the Faraday Medal of the Institution in 1953, and was elected an honorary member in 1956. He was also a member of the Institution of Civil Engineers.

Arrangements have been made by the Council of the Institution of Electrical Engineers for a memorial service to the late Sir Stanley to be held at 12.15 p.m. on 14th May at the Queen's Chapel of the Savoy.

**Mr. Harry Payn,** M.I.E.E., manager of the Boston District of the East Midlands Electricity Board, died on 24th April at the age of sixty-four. Mr. Payn was educated at Tiverton Middle School and University College, Exeter, and became a student apprentice with Edmundsons Electricity Corporation in 1912. After service in the R.E. during the 1914-18 war, he joined the Musselburgh & District Electric Light & Traction Co. in 1919 as chief assistant. He became manager of the Northwood Electric Light & Power Co. in 1921 and three years later he was appointed engineer and manager of the Boston & District Electric Supply Co., Ltd., a position he continued to hold until the industry was nationalised in 1948. Since then he had been manager of the Boston District of the Board.

**Mr. K. R. Hopkirk.**—The death occurred on 24th April of Mr. Kenneth Robert Hopkirk, who, until he retired in December last, was director and chief mechanical engineer of the British Thomson-Houston Co., Ltd. After graduating at Emmanuel, Cambridge, Mr. Hopkirk joined the B.T.H. Test Department at Rugby in 1915. Four years later he was placed in charge of the Turbine Test and at the end of 1920 joined the design staff of the Turbo-Generator Engineering Department, becoming chief in 1939. In 1945 Mr. Hopkirk was appointed assistant chief mechanical engineer of the company and in 1949 became chief mechanical engineer. Later in the same year he was elected to the board.

*The late Mr. K. R. Hopkirk*

During the whole of his service with B.T.H. Mr. Hopkirk was concerned with turbine problems, and carried out much pioneer work, especially in mechanical matters. On the electrical side he was closely identified with the development of turbo-alternators up to the largest sizes during the past thirty years, especially with the design of 33 kV windings and the associated problems of surge protection. He was responsible for the design of the largest 3,000 r.p.m. air-cooled alternators at present operating in this country (75 MVA, 0·67 p.f., 33 kV). A new type of B.T.H. turbo-alternator rotor-winding, which involved a large degree of mechanical development, was his invention.

**Mr. Isaac Vincent Robinson,** Wh.Sch., M.I.C.E., M.I.Mech.E., former secretary of the Steam Turbine and Allied Plant Sections of the B.E.A.M.A. died on 16th April.

*The late Mr. I. V. Robinson*

Mr. Robinson served his apprenticeship at the Central Marine Engine Works, West Hartlepool, and obtained a Whitworth Exhibition and a National Exhibition tenable at the Royal College of Science, South Kensington. He went to sea for a short time and in 1902 joined Richardsons, Westgarth & Co. He joined the staff of B.E.A.M.A. in 1919 and retired in 1955. He also represented the Association on many bodies, including the International Steam Tables Conference. He was president of the Whitworth Society in 1947.

**Lt.-Col. C. H. Brazel.**—The death occurred on 26th April at Swansea of Lt.-Col. Claude Hamilton Brazel, C.M.G., M.C., M.I.E.E. Col. Brazel was director of the Electrical Department of the Bahamas from 1926 to 1934 and chief engineer and manager, Government Electrical Undertakings, Ceylon, from 1934 to 1948.

**Mr. Percy Henry Bastie,** who was a director of Ernest F. Moy, Ltd., for sixty-three years, died on 21st April at the age of eighty-eight.

**Mr. Clement Tattersall Myers,** who had represented Falk, Stadelmann & Co., Ltd., in the Manchester area for the past twenty-eight years, died on 18th April at the age of fifty-seven.

## I.E.E. Annual Report

Copies of the annual report of the Council of the Institution of Electrical Engineers for the session 1958-59 and of the accounts for the year ended 31st December, 1958, to be presented at the annual general meeting on 14th May (5.30 p.m.) at the Institution of Civil Engineers, Great George Street, S.W.1, can now be obtained by members of the Institution on application to the secretary. The annual general meeting will be followed at approximately 6.30 p.m. by a lecture by Professor E. C. Cherry on "The Conceivable Future of Telecommunications."

# INDUSTRIAL NEWS

## Non-Registration of a Contractor's Apprentice

One of the last awards of the Industrial Disputes Tribunal (which has now ceased to function) relates to an apprentice employed by a Barrow-in-Furness electrical contractor, Mr. J. F. Lennon. Up to March last year apprenticeship in the electrical contracting industry was regulated by a scheme agreed between the National Federated Electrical Association and the Electrical Trades Union. When the scheme was terminated these two bodies established a temporary registration scheme which is still in force. Under this arrangement all contracting employers, whether members of the N.F.E.A. or not, were required to register their apprentices with the Association and the Association then passed on particulars to the Union.

In the case considered the employer was not a member of the Association. The Union found that the apprentice in question had not been registered and it (and the Association) made unsuccessful attempts to meet his employer to regularise the situation. In a communication passed on to the Tribunal the employer said that the Union had not approached him locally and he "did not think there was any point in attending a tribunal."

The Industrial Disputes Tribunal found that the temporary agreement contained the recognised terms and conditions of employment in the electrical contracting industry and that the employer was in breach of the agreement. The Tribunal required the employer to observe the recognised terms and conditions of the agreement and awarded accordingly. The Award is No. 1223 dated 6th February (H.M. Stationery Office, price 6d).

## New York Exhibition

Britain plans to put on the most striking demonstration of the best and most advanced in British science, technology and engineering ever to have been staged in the New World when the British Exhibition opens on 10th June, 1960, at the Coliseum Building in New York. The exhibition, which will last for two weeks, is being organised by the Federation of British Industries through its exhibition company, British Overseas Fairs, Ltd., and has the backing of the Government, the Dollar Exports Council and the British-American Chamber of Commerce in New York. Many of the ideas embodied in the British Pavilions at the Brussels World Exhibition last year will be applied in New York.

The third floor of the exhibition will be devoted to engineering products. A special feature will show examples of precision engineering. Individual exhibits will include both light and heavy engineering products, electrical, mechanical and chemical engineering goods, machinery and equipment for all industrial purposes, plastics, chemicals, drugs and pharmaceuticals, office equipment, agricultural machinery, radio and television sets, and sections for electronics, automation and instrumentation. A special section will be devoted to goods manufactured in North America under licence to British patents and formulæ.

## Moscow Trade Mission

Sir David Eccles, President of the Board of Trade, is to head a trade mission which is to go to Moscow later this month. The main purpose is to negotiate an agreement under which British firms will be able to increase the scope and volume of trade with Russia. The firms will act independently; there is no suggestion that the British Government will participate in the trade.

It is not intended that the Government should extend long-term credits to the Soviet authorities and the mission will not be empowered to discuss the present restrictions on "strategic" exports to Russia. The Government considers that there is ample scope for trade in goods not affected by the embargo.

## Equipment for Mersey Dredger

The electrical propulsion equipment which the General Electric Co., Ltd., is to supply for a new grab hopper dredger for the Mersey Docks and Harbour Board will include two main propulsion motors, each driving a propeller, supplied by one, two or all three of the diesel-generator sets on board the vessel. Each of these sets will consist of a Davey Paxman engine driving a 900 kW main propulsion generator coupled in tandem with a 450 kW auxiliary generator. Any one of the sets will be able to supply sufficient power for propulsion and for driving the four electric grab cranes when the vessel is dredging. Bridge control will be provided, both when dredging and when the vessel is moving at its maximum speed of 13½ knots with a full load of 2,200 tons of spoil, the control scheme ensuring optimum manœuvrability in confined waters. The four electric grab cranes will be supplied by Priestman Brothers.

## Hours and Wages

Mr. W. J. Carron, president of the Amalgamated Engineering Union, advised members to press for a shorter working week rather than for higher wages when he addressed the Union's annual conference last Monday. The employers could not be expected to consider both shorter hours and higher wages simultaneously. The trade recession did not appear to have seriously affected the engineering industry. There had been a slight fall in the A.E.U. membership but only 4,248 members of a total of 960,000 were unemployed.

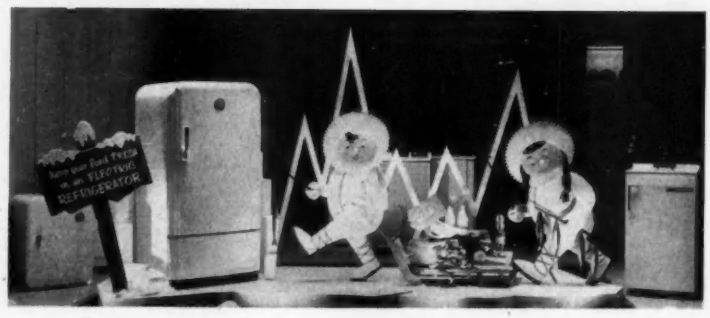
## Simon-Carves - Bruce Peebles Agreement

Simon-Carves, Ltd., Stockport, and Bruce Peebles & Co., Ltd., Edinburgh, announce the signing of an agreement for the joint design and supply of electronic-pneumatic and electronic-hydraulic control and interlocking equipment for mine car handling and skip winding plant and other mining applications. A new approach to mining control problems, backed by the two companies with their wide combined experience of mining and electronic control, has resulted in the development of a completely contactless control system. The production of the new equipment marks an important advance in control technique. Several contracts are already in hand for new sinkings and improvement programmes.

## Window Display Competition

The London Electricity Board was awarded first prize in the services division of the recent window display competition held by the Regent Street Association, London. The emphasis

*The Regent Street window display of the London Electricity Board which won first prize in the Regent Street Association's competition*



was on selling and "saleability" and the Board's display was designed and constructed in its own Display Department.

### E.M.I. Computer for Australia

The first order from Australia for an EMIAC II analogue computer was recently received by E.M.I. Electronics, Ltd., from the Australian Government Aircraft Factory, Melbourne. The contract is for a two-module computer. The EMIAC II is a general-purpose analogue computer particularly suited to deal with the varying work patterns handled by the Australian establishment. It is designed to be built up in module form to meet an expanding requirement.

A large EMIAC II computer installation which, the company says, will be one of the most powerful of its type in Great Britain, is due to commence operation at the Sir W. G. Armstrong Whitworth Aircraft Co., Ltd., in July. This computer will be used as an additional aid to research into guided missiles and other problems associated with high-speed flight.

### Service Centre Competition

About ninety service centres from all over the West Country have entered the South Western Electricity Board's two service centre display competitions for which the preliminary judging begins this week. The first competition is for large service centres who are competing for the Frank Forrest Silver Trophy. The general display competition is for smaller service centres. Competing teams have to design and complete a main window display showing the value of electric refrigeration. The finals of both competitions will be judged in the second week of May by Mr. A. J. Symes, Mrs. Frank Forrest and Mr. R. F. Richardson, the Board's chief commercial officer.

### Remploy Exhibitions

Exhibitions and stock rooms are being arranged during the coming months by Remploy, Ltd., in eighteen towns throughout the country. A list of the towns and the dates on which these will be held can be obtained from the company at 25-28, Buckingham Gate, London, S.W.1.

### "Aluminium Foil and Strip for Electrical Windings"

We were indebted to the Tyne Chemical Co., Ltd., for permission to reproduce Figs. 2 and 3 in the article under this heading published in our issue of 10th April.

### Steel Foundry Service

The North British Steel Foundry, Ltd., Bathgate, Scotland, has issued a 28-page illustrated booklet in which it describes the way in which its foundry is equipped to provide a steel foundry service. Among matters discussed are the controls over processes, materials and production that are applied, the machining of steel castings and their conjunction into part-assemblies. The booklet also contains an at-a-glance reference section in which the mechanical properties, chemical test requirements and equivalent specifications are given for 31 steels as well as short descriptions of their individual properties and applications. Copies of the publication are obtainable free from the company.

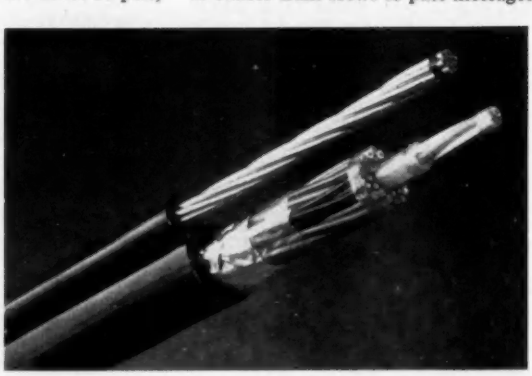
*A new three-dimensional sales unit, 10in high and in full colour, for the "Redring" boiling plate which is now available from district offices of the Metropolitan-Vickers Electrical Co., Ltd.*

### Radio Hobbies Exhibition

The International Radio Hobbies Exhibition will be held from 25th to 28th November next at the Royal Horticultural Society's Old Hall, Westminster, S.W.1. Particulars can be obtained from Mr. P. A. Thorogood, G4KD, 35, Gibbs Green, Edgware, Middx.

### Self-Supporting Cable

A self-supporting overhead telephone line with cable and suspension strand integrally sheathed has been supplied and installed by Siemens Edison Swan, Ltd., on the 15-mile Ramsgate-Canterbury railway line. The design of this type of cable is often referred to as the "cottage loaf" owing to its unusual cross-section. Three sizes of cable are used: 16-pair, 20-pair and 28-pair. The 0·050in 40 lb/mile conductors are polythene insulated and laid up in star quad formation, the requisite number of quads being stranded together and a screening applied overall. The cable and suspension strand are integral in the overall p.v.c. sheath.



*Siemens Edison Swan self-supporting telephone cable*

### Exhibition Train for Canada

An exhibition of British engineering products which will travel across Canada next year in a specially designed train is being planned by the British Engineers' Association. The train, which will consist of up to 60 cars, will start from Vancouver in April and be on view for a week at a time in six of Canada's main industrial centres, including Edmonton, Winnipeg, Montreal and Halifax. It may also visit the British Trade Fair which opens in New York in June, 1960. The project is expected to cost about £500,000. Interest has already been shown by some of the exhibitors at the Engineering, Marine, Welding and Nuclear Energy Exhibition at Olympia, the success of which has encouraged the B.E.A. in its plans. It has been suggested that a British diesel-electric locomotive might be sent to Canada to help draw the train.

### Atomic Ship Propulsion

The Admiralty announced last week that it had received from British firms studies based on nuclear reactor systems in which they were interested commercially. These studies, combined with those based on the United Kingdom Atomic Energy Authority's advanced gas-cooled reactor, would assist the Civil Lord's Committee in its task of recommending a system for use in the first nuclear-powered British merchant ship.

Babcock & Wilcox, Ltd., stated in this connection that they had presented a detailed proposal for a reactor of the pressurised water type based on the experience of the company and the American Babcock & Wilcox Co. The American company has a contract in hand for the first nuclear-powered merchant ship which is scheduled to be launched this year.

### Telephones in Trains

British Railways are to provide telephonic communication between the guard's and driver's compartments of electric and diesel multiple-unit trains to enable train crews to pass messages

and carry out test procedures in clear speech. Telephones are already fitted to some multiple-unit electric trains and other diesel and electric units have bell or buzzer communications at present.

A telephone system between the guard's and driver's compartments will be provided in all new electric and diesel multiple-unit trains and will also be fitted in existing stock. The telephones will help drivers and guards to carry out brake tests before beginning their journeys and to observe the various rules, particularly on services where drivers or motormen are alone. Telephonic communication between the two ends of a train would also be an advantage in the event of an emergency.

## Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Monday last.

| | |
|---|---|
| ALUMINIUM ingots | ton £180 0s 0d |
| COPPER, H.C. Electro | ton £234 5s 0d |
| Fire Refined 99·70% | ton £233 0s 0d |
| Fire Refined 99·50% | ton £232 0s 0d |
| COPPER Tubes .. | lb 2s 3½d |
| Sheet .. .. | ton £264 10s 0d |
| H.C. wire and strip.. | ton £285 15s 0d |
| LEAD, English .. | ton £70 5s 0d |
| Foreign .. .. | ton £69 0s 0d |
| MERCURY .. .. | flask £79 0s 0d |
| TIN, block (English) .. | ton £782 0s 0d |
| ZINC, G.O.B. Foreign | ton £74 5s 0d |
| BRASS Tubes (solid drawn) .. .. | lb 1s 10d |
| Wire .. .. | lb 2s 7¾d |
| PHOSPHOR BRONZE Wire .. .. | lb 4s 1d |
| PLATINUM .. .. | oz £28 10s 0d |
| RUBBER, No. 1 R.S.S. spot .. .. | lb 28½d—28¼d |

## Birmingham Lighting Conference

The British Lighting Council, Limited, held a conference for architects on lighting at the Midland Hotel, Birmingham, on 16th April. This was the first of its kind to be held in the provinces. Mr. G. Redmond, chairman of the Area Advisory Committee of the B.L.C., opened the meeting at which he outlined the history of the British Lighting Council, Ltd. This was followed by Mr. A. D. S. Atkinson, who addressed the gathering on the "Functional Characteristics of Electric Lamps," his talk being illustrated by demonstrations. A paper on "Overseas Lighting Practice" was given by Dr. H. H. Ballin, illustrated by coloured slides.

## Driverless Truck for Railways

The Western Region of British Railways is experimenting at Newton Abbot with two driverless trucks. They are being used to convey goods which have been discharged from wagons at chosen points for loading into cartage vehicles for outward delivery. The platform truck used is of the standard railway type Scott battery-electric vehicle fitted with the E.M.I. Electronics, Ltd., system known as the "Robotug." This electronic driving system operates by making the trolley follow a single wire laid just beneath the flooring carrying a ½ A current of a specified frequency. At Newton Abbot nine tracks have been laid ½in below the surface and overhead panels have been provided to enable the discharger of the tug and train to guide the vehicle to any given point in the shed.

*Driverless truck in British Railways goods depot at Newton Abbot*

## Refrigeration Exhibition

The first Industrial and Commercial Refrigeration Exhibition to be held in Britain will take place at the Royal Horticultural Society's Old Hall, Vincent Square, London, from 15th to 17th February, 1960. The exhibition is being sponsored by *World Refrigeration* and further information can be obtained from Mr. M. A. Elliott, 140, Cromwell Road, London, S.W.7 (telephone: Fremantle 4063).

## Price Reductions

The Westinghouse Brake & Signal Co., Ltd., has announced readjustments in the prices of its range of germanium power rectifier units resulting in reductions of up to 33 per cent on some types. A new publication (Technical Publication 601) has been issued, in which full details are given of the existing range of germanium rectifier units.

## Trade Announcements

**Londex, Ltd.,** is holding further private displays of its products. On 25th and 26th May there will be a display at the Empire Hotel, Leicester, and on 28th and 29th May at the Black Boy Hotel, Nottingham. The arrangements have been made in conjunction with the company's area representatives, Furse Wholesale, Ltd.

**Barber Electrical Services, Ltd.,** has appointed Mr. A. J. Meadon as northern area representative, covering Lancashire, Yorkshire, Cumberland, Durham, Northumberland, Westmorland and the Isle of Man. His address is 117, Bentham Drive, Liverpool, 16 (telephone: Childwall 3627).

Mr. A. W. Bates has been appointed technical sales representative of **E. K. Cole, Ltd.,** for Lancashire, North Wales and the north-east counties; he can be contacted at his home address, 55, Highbury Road East, St. Annes-on-Sea (telephone: St. Annes-on-Sea 0934), or at the Manchester office of the company, 115, Jersey Street, Ancoats, Manchester (telephone: Collyhurst 4421).

**Power Connectors, Ltd.,** has moved to larger premises at 2, Caxton Street, Westminster, London, S.W.1, thus retaining the same postal address. The telephone number, however, is now Abbey 1068 (3 lines).

The Electrical Appliances Division of **Philips Electrical, Ltd.,** has appointed a number of new representatives in its various regions throughout the country.

**Reed Corrugated Cases, Ltd.,** announces that a new 85in Langston board machine will begin production in the early summer at the Gorse Green, Wigan, factory which the Reed Paper Group has taken over from British Celanese, Ltd. The new branch will enable the company to give northern counties customers better service. It will have its own sales, design and transport departments.

**Thermair Domestic Appliances, Ltd.,** Witton, Birmingham, and the **Brattel Electric Co., Ltd.,** of 1-9, Dover Yard, Berkeley Street, London, W.1, announce that as from 1st April Thermair Domestic Appliances, Ltd., is distributing "Thermair" and "Saturn" spin dryers through its own sales organisation, the arrangement whereby the Brattel Electric Co., Ltd., has had a sole selling agency having come to an end.

## Catalogues Wanted

Messrs. Oscar Faber & Partners, consulting engineers, of London and St. Albans, Herts., have opened an office at 31, College Gardens, Belfast (telephone: Belfast 33088), and would be glad to receive catalogues and trade literature dealing with structural, mechanical and electrical services.

## Welding Transformer-Rectifier

In our issue of 17th April (page 737) the outputs of the English Electric LWAD 600 portable welding transformer-rectifier were given as 95-200 A and 116-624 A. These should have read 95-520 A and 116-624 A.

***Financial Section***

# STOCKS and SHARES

WITH the virtual certainty of no General Election in the near future, Stock Exchange markets continue to receive a substantial flow of business, with the buyers usually in the ascendancy. Near the end of the past month the index to industrial share prices rose indeed to another new record. In the electrical sections lively discussion has been maintained over points arising from comments by Lord Chandos, in the A.E.I. report and in a subsequent statement, on the subject of amalgamations in the electrical (and particularly in the cable) industries, and of results from nuclear power station contracts.

## Cable Shares

In the cable manufacturing section of the industrial market a main topic of late has been the publication of a letter written by Lord Chandos in which he dismissed the idea, so far as his company was concerned, of a war of attrition between the A.E.I. and B.I.C.C. groups. They would remain competitors in the cable field, he wrote, but only in a normally commercial way. A.E.I. shares have since been marked up by a further 1s 3d, to 61s 3d, while B.I.C.C. shares were advanced 3s 9d to 56s 3d on further consideration of the company's results for 1958. These revealed a 12 per cent improvement in trading profits, which provided for an increase of 1 per cent in the dividend to 13½ per cent. They also gave the impression that the second half of the year had been a good deal more profitable than the first six months.

## Higher Prices

Plessey 10s shares were marked up by as much as 8s 9d, to 87s, after the company's announcement of a proposed two-for-one scrip issue and of the intention to offer further shares for cash. Demand for the shares of Lancashire Dynamo Holdings has been another feature of the electrical markets since this company's report of increased profits in 1958 and an addition of 1½ per cent to the dividend. Having risen a further 5s to 57s 6d, they showed a net gain of 8s over the past month. Also on the strength of recently reported increases in earnings and the dividend, Davis & Timmins advanced to 15s. Among many improvements in shares connected with domestic equipment, the further advance of 1s in Bulpitts to 13s 6d was outstanding: the company's annual report confirmed the good impression made by the preliminary statement of results. Improvements were recorded also in Vactric, British Vacuum Cleaner, Falk Stadelmann and Burco. Automatic Telephone & Electric were firm in anticipation of the final dividend declaration.

## Engineering Results

Shareholders of Babcock & Wilcox were advised last year that in view of the long-term objectives of much of present capital expenditure, and because of the persistent pressure on profit margins, a period of somewhat lower earnings was possible. All the same, there was some disappointment in the market over the extent of the contrac-

## *Price Changes in*

| Company or Board | Nom. Value | Middle price 27th April | Week's Rise or Fall | Dividend Previous | Dividend Last | Yield % | 1959 Highest | 1959 Lowest |
|---|---|---|---|---|---|---|---|---|
| *Gilt-edged Stocks* | | | | | | £ s d | | |
| Brit. Elec. 1968/73 | 100 | 78½ | | 3 | 3 | 3 16 6 | 80½ | 77½ |
| Brit. Elec. 1974/77 | 100 | 75½ | | 3 | 3 | 3 19 6 | 77 | 74½ |
| Brit. Elec. 1976/79 | 100 | 79 | | 3½ | 3½ | 4 8 6 | 80½ | 77½ |
| Brit. Elec. 1974/79 | 100 | 89 | | 4½ | 4½ | 4 15 6 | 90½ | 87½ |
| *Overseas Electric Supply* | | | | | | | | |
| Calcutta Elec. | £1 | 18/6 | +6d | 6·8† | 7† | 13 4 0 | 18/6 | 16/- |
| East African Power | £1 | 20/- | | 7½ | 8 | 8 0 0 | 22/3 | 19/3 |
| Nigerian Elec. | £1 | 14/6 | | 10 | 10 | 13 16 0 | 15/- | 13/9 |
| Perak Hydro-Elec. | £1 | 13/6 | | 12½ | 10 | 14 16 6 | 14/6 | 12/3 |
| *Electrical Shares* | | | | | | | | |
| Aberdare Holdings | 5/- | 16/- | | 17½ | 17½ | 5 9 6 | 16/3 | 15/6 |
| Aerialite | 1/- | 9/- | −3d | 51½ | 54 | 6 0 0 | 9/6 | 7/9 |
| Allen, W. H. | £1 | 45/6 | +6d | 10 | 11 | 4 17 9 | 45/6 | 43/- |
| Anglo-Portuguese Tel. | £1 | 28/3 | | 8 | 9 | 6 7 6 | 29/3 | 26/6 |
| Aron Elec. Ord. | £1 | 57/6 | | 15 | 15 | 5 4 3 | 61/6 | 57/6 |
| Assoc. Elec. Ord. | £1 | 61/3 | +1/3 | 15 | 15 | 4 18 0 | 61/3 | 53/9 |
| Automatic Tel. & El. | £1 | 82/- | +2/- | 17 | 17 | 4 3 0 | 82/- | 77/6 |
| Babcock & Wilcox | £1 | 49/- | −2/3 | 13½ | 13 | 5 6 0 | 53/9 | 45/6 |
| Bakelite | 10/- | 26/9 | −3d | 15 | 15 | 5 12 3 | 27/6 | 22/- |
| Baldwin, H. J. | 2/- | 2/6 | | 20 | 20 | — | 3/- | 2/3 |
| Berry's Electric | 5/- | 15/6 | | 10 | 10 | 3 4 6 | 15/9 | 10/9 |
| Bowthorpe Holdings | 2/- | 15/6 | +3d | 37½ | 25* | 3 4 6 | 15/6 | 11/9 |
| British Elec. Traction: Def. Ord. "A" | 5/- | 39/- | +1/- | 25 | 25 | 3 4 0 | 40/- | 35/6 |
| B.I. Callender's | £1 | 56/3 | +3/9 | 12½ | 13½ | 4 16 0 | 56/3 | 44/9 |
| B.I. Callender's 6% Pref. | £1 | 20/- | | 6 | 6 | 6 0 0 | 20/6 | 19/9 |
| British Thermostat | 5/- | 42/6 | +1/9 | 25 | 30 | 3 10 6 | 42/6 | 37/- |
| British Vac. Cleaner | 5/- | 7/9 | +3d | 10 | 7½* | 4 16 9 | 7/9 | 4/6 |
| Brook Motors | 10/- | 53/9 | | 25 | 24½* | 4 10 0 | 54/- | 46/- |
| Bulgin, A. F. | 1/- | 8/9 | | 45 | 50 | 5 14 3 | 9/3 | 6/9 |
| Bulpitts | 5/- | 13/6 | +1/- | — | 15 | 5 11 0 | 13/6 | 10/- |
| Burco Dean | 5/- | 13/6 | +3d | 22½ | 16* | 5 18 6 | 13/3 | 12/3 |
| Cable & Wireless: Ord. | 5/- | 14/9 | +9d | 10 | 10* | 3 7 9 | 14/9 | 12/3 |
| 4% Loan | 100 | 94½ | | 4 | 4 | 4 4 9 | 95 | 93 |
| Chloride El. Storage "A" | £1 | 78/9 | −9d | 17½ | 20‡ | 5 1 6 | 79/6 | 65/6 |
| Clarke Chapman | £1 | 57/- | −4/3 | 27½ | 13½* | 4 16 6 | 66/3 | 57/- |
| Cole, E. K. | 5/- | 17/6 | −9d | 17½ | 17½ | 5 0 0 | 21/3 | 17/3 |
| Contactor Switchgear | 5/- | 13/- | | 20 | 14* | 5 7 9 | 13/- | 12/- |
| Cossor, A. C. | 5/- | 8/6 | −3d | 2½ | Nil | Nil | 9/- | 6/3 |
| Crabtree | 10/- | 31/- | | 20 | 20 | 6 9 0 | 31/6 | 28/- |
| Crompton Parkinson | 5/- | 14/3 | +3d | 16 | 12* | 4 4 3 | 14/3 | 11/9 |
| Davis & Timmins | 5/- | 15/- | +6d | 18 | 20 | 6 13 3 | 15/3 | 14/6 |
| De La Rue | 10/- | 35/- | | 35 | 17½* | 5 0 0 | 35/- | 30/3 |
| Decca "A" | 10/- | 33/9 | | 43½ | 50 | 5 18 0* | 40/3 | 33/9 |
| Desoutter | 5/- | 26/9 | +1/6 | 32½ | 21½*‡ | 4 1 0 | 26/9 | 19/- |
| Dewhurst | 2/- | 7/6 | | 20 | 20 | 5 6 9 | 8/3 | 7/3 |
| Dictograph Tel. | 2/- | 7/9 | | 20 | 20 | 5 3 3 | 7/9 | 7/- |
| Dubilier Condenser | 1/- | 3/9 | | 30 | 20* | 5 6 9 | 4/- | 3/3 |
| Duport | 5/- | 11/3 | +3d | 25 | 12½* | 5 11 0 | 11/3 | 10/3 |
| E.M.I. | 10/- | 55/- | −1/- | 15 | 20*‡ | 3 12 9 | 64/6 | 50/- |
| Electrical Apparatus | 5/- | 13/6 | | 12½ | 14½ | 5 2 6 | 14/- | 13/- |
| Electrical Components | 5/- | 11/6 | | 12½ | 12½ | 5 8 9 | 11/9 | 10/6 |
| Elec. Construction | £1 | 30/- | | 8½ | 8½ | 5 13 3 | 30/3 | 27/9 |
| Elliott-Automation | 5/- | 23/9 | | — | 10 | 2 2 0 | 23/9 | 16/9 |
| Enfield Cable Ord. | £1 | 19/9 | +9d | 2½ | Nil | — | 22/3 | 16/3 |
| English Electric | £1 | 63/9 | −6d | 14 | 14 | 4 7 9 | 65/6 | 56/9 |
| English Electric 3½% Pref. | £1 | 12/6 | | 3½ | 3½ | 6 0 0 | 12/9 | 12/3 |
| Ericsson Tel. | 5/- | 23/3 | | 12† | 13† | 4 17 6 | 27/3 | 25/9 |
| Ever Ready | 5/- | 28/- | +6d | 37½ | 20* | 3 11 6 | 28/- | 22/- |
| Falk Stadelmann | £1 | 27/6 | +6d | 17½ | 10*‡ | 7 5 6 | 32/9 | 26/3 |

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

tion of earnings in 1958, when the group profits declined by 28 per cent to £3·27 million. There is no difficulty, however, in bringing the dividend up to the total of 13 per cent forecast at the time of the share issue at the beginning of last year. This distribution is covered more than twice by the net surplus and gives a yield of a little over 5½ per cent on the £1 shares at 49s. Previously, Simon-Carves had reported a moderate improvement in group profits for the past year. The maintained dividend of 25 per cent has threefold cover from the available earnings. After easing to 30s 9d, the 5s shares offer a yield of 4·1 per cent. Shareholders recently received a special 7½ per cent distribution from capital profits.

## *Electrical Investments*

| Company or Board | Nom. Value | Middle price 27th April | Week's Rise or Fall | Dividend Previous | Dividend Last | Yield % £ s d | 1959 Highest | 1959 Lowest |
|---|---|---|---|---|---|---|---|---|
| *Electrical Shares—continued* | | | | | | | | |
| G.E.C. | £1 | 32/- | −6d | 12½ | 10 | 6 5 0 | 40/3 | 31/3 |
| G.E.C. 6½% Pref. | £1 | 21/- | | 6½ | 6½ | 6 3 9 | 21/6 | 20/3 |
| General Cables | 5/- | 8/9 | | 24 | 15 | 8 11 6 | 9/- | 7/6 |
| Greenwood & Batley | £1 | 83/- | +1/3 | 17½ | 20 | 4 16 6 | 83/9 | 75/- |
| Hackbridge Holdings | 5/- | 15/3 | | 20 | 20 | 6 11 3 | 15/6 | 14/3 |
| Hackbridge & Hewittic | 5/- | 14/6 | −3d | 20 | 20 | 6 18 0 | 15/9 | 13/9 |
| Head Wrightson | 5/- | 26/9 | −1/9 | 22½ | 17½* | 3 5 6 | 28/6 | 24/3 |
| Heatrae | 2/- | 9/- | | 15 | 20 | 4 9 0 | 9/- | 7/6 |
| Holophane | 5/- | 15/6 | | 37½ | 22½* | 7 5 3 | 16/6 | 15/6 |
| Hoover | 5/- | 63/6 | | 50 | 60 | 4 14 6 | 65/3 | 55/- |
| I.C.I. | £1 | 34/6 | | 12 | 8* | 4 12 9 | 38/3 | 33/- |
| Intl. Combustion | 5/- | 36/3 | | 25 | 30‡ | 4 2 9 | 36/3 | 29/9 |
| Intl. Computers & T. | £1 | 67/6 | | — | 8‡ | 2 7 6 | 70/3 | 57/6 |
| Johnson & Phillips | £1 | 27/- | +9d | 10 | 5 | 3 14 0 | 30/6 | 22/- |
| Lancashire Dynamo | £1 | 57/6 | +5/- | 11 | 12½‡ | 4 7 0 | 57/6 | 42/- |
| Laurence Scott | 5/- | 17/9 | +6d | 15 | 15 | 4 4 6 | 17/9 | 16/6 |
| Lister, R. A. | £1 | 38/6 | | 10 | 12½ | 6 9 9 | 41/- | 32/9 |
| Lucas, J. | £1 | 46/- | | 7½ | 10‡ | 4 7 0 | 46/6 | 43/3 |
| Marconi Marine | £1 | 39/6 | | 10 | 10 | 5 1 3 | 48/6 | 40/6 |
| Marryat & Scott | 2/- | 9/6 | | 35 | 37½ | 3 19 0* | 9/6 | 8/6 |
| Mather & Platt | £1 | 47/- | +2/3 | 15 | 10‡* | 4 10 9 | 51/6 | 41/3 |
| Metal Industries | £1 | 44/6 | −6d | 9 | 14 | 6 4 9 | 46/- | 39/9 |
| Midland Elec. Mfg. | £1 | 45/- | | 12½ | 10* | 4 9 0 | 45/- | 41/6 |
| Morphy-Richards | 4/- | 22/6 | | 20 | 20 | 3 11 0 | 22/6 | 18/- |
| Murex | £1 | 47/6 | −1/9 | 20 | 17½ | 7 7 3 | 49/6 | 42/- |
| Newman Ind. | 2/- | 2/9 | | 10 | 10 | 7 5 6 | 2/9 | 2/3 |
| Oldham & Son | 1/- | 3/- | | 17½ | 17½ | 5 16 9 | 3/- | 2/6 |
| Parsons, C. A. | £1 | 48/9 | −1/3 | 7½ | 8½ | 3 6 9 | 55/9 | 47/3 |
| Philips' Lamps | Fl.10 | 112/6 | +1/- | 14 | 14 | 2 7 3 | 116/- | 88/- |
| Plessey | 10/- | 87/- | +8/9 | 30 | 30 | 3 9 0 | 87/- | 70/6 |
| Pye | 5/- | 14/3 | −3d | 12½ | 12½ | 4 7 9 | 16/9 | 13/9 |
| Pyrotenax | 5/- | 35/- | −1/6 | — | 27½‡ | 3 18 6 | 38/3 | 33/9 |
| Reliance Clifton | 5/- | 18/- | +3d | 13½ | 15 | 4 3 3 | 19/9 | 17/6 |
| Reyrolle | £1 | 87/6 | −2/6 | 17½ | 17½ | 4 0 0 | 98/- | 86/6 |
| Rheostatic | 4/- | 9/6 | +9d | 12½ | 12½ | 5 5 3 | 9/6 | 8/3 |
| Richardsons Westgarth | 10/- | 14/3 | −1/- | 16‡ | 8½* | 5 16 6 | 15/3 | 13/9 |
| Scottish Cables | 4/- | 14/9 | | 27½ | 27½ | 4 7 0* | 16/3 | 13/3 |
| Simon-Carves | 5/- | 30/9 | −1/3 | 25 | 25 | 4 1 3 | 32/- | 28/6 |
| Smith (England), S. | 4/- | 13/3 | | 20 | 12½*‡ | 3 15 6 | 13/3 | 11/6 |
| Southern Areas | £1 | 12/- | +1/6 | 7½ | Nil | Nil | 14/9 | 10/6 |
| Strand Elec. | 5/- | 10/3 | +1/6 | 15 | 15 | 7 6 3 | 10/3 | 8/6 |
| Sturtevant | 5/- | 18/3 | +6d | 15† | 15† | 7 3 0 | 19/- | 17/- |
| Sun Elec. | £1 | 80/6 | | 25 | 25 | 6 4 3 | 80/- | 66/- |
| Switchgear & Cowans | 5/- | 12/3 | | 22½ | 15* | 6 2 6 | 13/- | 10/3 |
| Taylor Tunnicliff | 5/- | 22/9 | | 17½ | 17½ | 3 17 0 | 26/- | 18/- |
| T.C.C. | 10/- | 43/9 | | 25 | 25 | 5 14 3 | 43/9 | 38/- |
| Telephone Mfg. | 5/- | 5/9 | +3d | 10 | 10 | 8 14 0 | 5/9 | 4/9 |
| Telephone Rentals | 5/- | 13/6 | | 12½ | 12½‡* | 4 12 6 | 13/6 | 11/9 |
| Thompson (John) | 5/- | 24/3 | −9d | 25 | 25 | 5 3 0 | 25/6 | 22/9 |
| Thorn Elec. | 5/- | 36/3 | +1/9 | 17½ | 17½ | 2 8 3 | 38/6 | 26/3 |
| Thornycroft | £1 | 23/9 | | 12½ | 7½ | 6 6 3 | 23/9 | 20/6 |
| Tube Investments | £1 | 83/9 | −9d | 15 | 17½ | 4 3 6 | 85/3 | 71/6 |
| Vactric | 5/- | 38/9 | +2/6 | 25 | 25 | 3 4 6 | 44/6 | 26/3 |
| Veritys | 5/- | 2/6 | | 12½ | 2½ | — | 5/- | 1/3 |
| Walsall Conduits | 4/- | 20/- | +1/- | 20 | 22½ | 4 10 0 | 20/- | 16/9 |
| Ward & Goldstone | 5/- | 40/6 | | 40 | 25* | 3 1 9 | 40/6 | 30/6 |
| Watford | 2/- | 9/- | | 25 | 25* | 5 11 0 | 9/- | 7/6 |
| Westinghouse | £1 | 43/9 | | 10 | 10 | 4 11 6 | 47/- | 39/6 |
| West, Allen | 5/- | 12/9 | −6d | 12½ | 11‡* | 4 12 6 | 14/- | 11/9 |
| Wolf Electric | 5/- | 7/9 | −6d | 10 | 10 | 6 9 0 | 8/6 | 7/9 |

### Mixed Changes

Shares of several members of the main nuclear power groups have remained dull under the influence of references at the A.E.I. meeting to losses on present contracts in that field, and of the fall reported in Babcock & Wilcox's profits. The easier trend was apparent in Reyrolle, Parsons, Head Wrightson, Richardsons Westgarth, and Clarke Chapman. Allen West receded further to 12s 9d, reflecting the contraction of profits reported earlier, and despite the increase in the dividend, while Cossor gave up part of their previous advances. Pyrotenax were lower at 35s, but Johnson & Phillips moved up to 27s and there were useful gains elsewhere in Thorn Electrical, Walsall Conduits, Telephone Manufacturing, and Desoutter Bros. A rise in Enfield Rolling Mills to 47s 6d was reflected in Enfield Cables at 19s 9d.

### Elliott-Automation

The final dividend declared by Elliott-Automation brings the total for 1958 to 10 per cent, as previously forecast by the company. After the declaration the 5s shares were little changed on balance at 23s 9d. They offer a yield of less than 2½ per cent, which witnesses the strength of investment confidence in the future of the automation, electronic and allied equipment in which the group specialises. Comparison of the figures in the preliminary statement with the previous results is complicated by the intervening sale of the Associated Insulation Products subsidiary to A.E.I., but the net profit of £459,000 is up to market estimates. At the time of the A.I.P. sale in June, the company said that this produced a net addition of around £1·7 million to the group's cash resources.

### Company News

Laurence, Scott & Electromotors 5s "A" shares hardened to 17s 9d after the announcement of a proposed one-for-six scrip issue. The results for last year show trading profits again at a little over the million mark and there is no change in the well-covered 15 per cent rate of dividend. Interest revived in the shares of Strand Electric and Southern Areas, the quotations rising by 1s 6d in each case to 10s 3d and 12s respectively. Results for 1958 of the latter company, which paid no dividend for 1957, are due shortly. Strand Electric's financial year has just ended. Newman Industries report an expansion of 17 per cent to £44,000 in the net taxed profit for 1958. At 2s 9d the shares offer a yield of 7½ per cent on the dividend, which is being maintained at the previous rate of 10 per cent.

# REPORTS and DIVIDENDS

**A. Reyrolle & Co., Ltd.**—The preliminary figures for 1958 given in our issue of 17th April are confirmed by the report and accounts now issued. In his statement, which has been circulated with the report and accounts, Mr. H. H. Mullens (chairman and managing director) says that the output from the works in 1958 exceeded that of the previous year and again created a new high record, the production of metal-enclosed switchgear, remote control equipment, system protection, and relays, making particularly noticeable contributions to this satisfactory result. The shops for the nuclear products, where special steps have to be taken to maintain the requisite high standards of cleanliness, have been brought into full production, and the shops at Newburn-on-Tyne for machining graphite are also now running at maximum output. Modern methods of production need an increasing amount of jigs and tools and to meet these growing requirements a three-storey factory has been built at the New Town Works.

The value of orders secured in 1958 was below the high level of 1957, due primarily to the curtailment of capital expenditure at home. The demand for switchgear from industrial concerns and oil companies was maintained, but orders for the Electricity Boards were reduced, and in the second half of the year the National Coal Board severely curtailed expenditure, resulting in a substantial reduction in its requirements for surface and underground flameproof equipment. The more important orders received during the year included 132 kV and 275 kV equipment for the C.E.G.B., a notable example being the circuit-breakers for the British end of the cross-Channel power link. From overseas, substantial orders had been received from Trinidad, Venezuela, the Netherlands, Southern Rhodesia, South Africa and India. During the year under review it was possible, in spite of severe price competition, to keep the profits at very nearly the level of the previous year by achieving a record output, but the order book today reflects the recession in the volume of world trade and it is unlikely that the same output can be reached in the current year.

The United Kingdom Atomic Energy Authority has placed a contract with the company for the design and development of special control switches for the "Zeta" project at Harwell. Referring to the construction of the Bradwell power station by the Nuclear Power Plant Co., Ltd., of which Reyrolle's are members, the chairman says that in furtherance of this contract the machining of special reactor graphite began at the Newburn machine shops early in the year. The first supplies were from Canadian sources but later supplies have come from the new factory at Newburn of the Anglo Great Lakes Corporation, Ltd., in which Reyrolle's and C. A. Parsons & Co., Ltd., are financially interested. Referring to the nuclear power station at Latina, Italy, which the Nuclear Power Plant Co., Ltd., is building in collaboration with Agip Nucleare, Mr. Mullens says Reyrolle's are responsible for machining the nuclear graphite and supplying nuclear control equipment and conventional switchgear. Occupation of the new research laboratories began in January last. These have been laid out so as to provide flexible arrangements for preliminary testing without the need to occupy the capacity of the high power research station.

**Babcock & Wilcox, Ltd.**—Group profits for 1958, including investment income of £180,244, amounted to £3,277,626, as compared with £4,589,990 for 1957, and after charging £1,423,707 for taxation, the net balance is £1,853,919 (against £2,500,039), of which £1,761,400 (£2,420,903) is attributable to the parent company. It is proposed to pay a final dividend of 7 per cent, making 13 per cent for the year. The total for the previous year was 13¾ per cent, but the interim dividend for that year was paid on smaller capital.

**Simon-Carves, Ltd.**—The preliminary statement for the year ended 31st December last shows a group profit of £1,461,814, as compared with £1,408,585 for the preceding year, and after deducting £751,843 for taxation and £5,200 minority interests, the net balance is £686,301 (against £669,967). Revenue reserves receive £103,884, and it is proposed to pay a final dividend of 15 per cent, maintaining the distribution for the year at 25 per cent. The balance carried forward is £332,501 (against £200,458 brought in).

**Elliott-Automation, Ltd.**—The group net profits for 1958, excluding profits of the Associated Insulation Products group, sold last May, amount to £416,667, as compared with £293,123 for 1957, after taxation of £401,685. Associated Insulation Products profits are added for four months of £41,961 (against £118,528 for the full year) and the net profit attributable to the parent company is £458,628 (against £411,651). It is proposed to pay a final dividend of 6 per cent, making 10 per cent for the year.

**The Plessey Co., Ltd.**, is holding an extraordinary meeting on 26th May to create 8·6 million 10s ordinary shares and to capitalise £2·4 million of reserves by issuing two 10s ordinary shares for each existing ordinary share. The directors expect to declare an interim ordinary dividend of 18 per cent to be paid on 30th June next in respect of the year to that date. The new ordinary shares will not receive this interim dividend, but will rank for the final dividend. It is stated that the size of the proposed increase in the authorised capital is in part due to the fact that it is intended within the reasonably near future to make a further issue of ordinary capital on a rights basis. There is no intention of issuing any significant number of shares for cash (except on a rights basis to ordinary shareholders) or making any other issue which would affect the control of the company without the previous sanction of the shareholders.

**R. B. Pullin & Co., Ltd.**, is making a rights issue of 1,778,000 2s shares at 7s 3d each on a two-for-five basis. The issue will produce £218,184 net after providing £386,800 for the purchase, now announced, of Neville Brown & Co. and Milbo Photographic (the Neville Brown group). R. B. Pullin & Co. states that, assuming no major setback, the board intends to declare a second interim dividend of 5 per cent, payable on 15th July. This would be followed by a 20 per cent final dividend. The new shares will not receive the second interim dividend, but the whole of the increased capital will rank for the final.

**Pulsometer Engineering Co., Ltd.**—The group profit, including new subsidiaries, for 1958, is £405,591, as compared with £484,025 for 1957. Taking the full year's earnings for all companies now consolidated, however, it is stated that the comparative figure would have been £618,000. Taxation absorbs £162,976, and the balance attributable to the company is £163,533 (against £196,395). It is proposed to pay a final dividend of 12½ per cent, making 20 per cent for the year on increased capital (against 25 per cent).

**Laurence, Scott & Electromotors, Ltd.**—The trading profits for 1958 amount to £1,015,480, as compared with £1,031,207 for 1957, and after providing £410,000 for taxation, the net balance is £388,736 (against £395,044). The dividend for the year is maintained at 15 per cent, and it is proposed to make a scrip issue of one "A" ordinary share for every six "A" or "B" ordinary shares held.

**Worthington-Simpson, Ltd.**—After providing £515,000 for taxation, the net profit for 1958 is £543,759, as compared with £493,095 for the previous year. General reserve receives £336,000 and it is proposed to pay a final dividend of 10 per cent, making 17½ per cent on capital doubled by a free scrip issue. The total distribution for 1957 on the former capital was 30 per cent. The balance carried forward is £200,401 (£191,440 brought in).

**Newman Industries, Ltd.**, reports a group trading profit for 1958 of £178,093, as compared with £163,819 for the previous year, and after meeting all charges, including £32,300 for taxation, the net profit is £43,876 (against £37,420). A sum of £8,844 is

placed to capital reserve and the dividend for the year is unchanged at 10 per cent. The 6 per cent preferred capital also receives a participating dividend of 2 per cent (same). The balance carried forward is £207,262 (against £186,463 brought in).

**Radiation, Ltd.,** in which the Parnall (Yate) group was merged last year, reports group profits of £1,020,912 for 1958, as compared with £188,898 for 1957. Taxation absorbs £537,060 and the net profit is £483,852 (against £45,790), to which is added £4,676 over-provided tax. A sum of £20,000 is added to fixed assets replacement reserve, and it is proposed to pay a dividend for the year of 6 per cent (against 5 per cent) on increased capital. The balance carried forward is £737,795 (against £528,208 brought in).

**The Spencer Wire Co., Ltd.,** informs us that the recent take-over of the company by the Jackson Bridge Engineering Co., Ltd., refers to an internal reconstruction and does not involve any change of directorate or control, which remains as in the past with the Gill family. The authorised capital of the new company is now £900,000.

**The Ever Ready Trust Co., Ltd.,** reports that after providing £50,000 for taxation the net revenue for 1958 is £57,832, as compared with £54,437 for 1957. It is proposed to pay a final dividend of 10 per cent (9 per cent), making 16 per cent (15 per cent) for the year. It is also proposed to make a one-for-nine rights issue of new 5s shares at 14s per share.

**Wm. Sanders & Co. (Wednesbury), Ltd.**—The profit for 1958 is £31,393, as compared with £34,809 for 1957. Taxation requires £15,572, and the dividend for the year is unchanged at 20 per cent.

**The National Electric Construction Co., Ltd.**—The group profit for 1958, after deducting £87,397 for taxation, is £104,876, as compared with £99,061 for 1957. The dividend for the year is unchanged at 17½ per cent.

**Contactor Switchgear, Ltd.,** has announced an interim dividend of 4 per cent (unchanged).

**Cable & Wireless (Holding), Ltd.,** is paying a first interim dividend of 2½ per cent (unchanged).

## New Companies

**Brunt Variable Speed Motors, Ltd.**—Registered 9th April. Capital £200,000. To acquire the business carried on at Oldham as Armature Manufacturing Co., and to carry on the business of manufacturers and marketers of variable speed electric motors, automobile, marine and aircraft test equipment, etc. Directors: S. S. Hammersley, C. H. Brunt, F. Swift and T. R. Hardman. Regd. office: Rushbank Electrical Works, Middleton Road, Oldham.

**Legg (Industries), Ltd.**—Registered 1st April. Capital £20,000. To acquire the business of manufacturers of electrical rectifying equipment transformers, battery charging equipment and general electrical equipment heretofore carried on at Wolverhampton by L. I. Investments (Wolverhampton), Ltd. (formerly Legg (Industries), Ltd.). Directors: C. Tully and R. Tully. Solicitors: Pinsent & Co., Birmingham, 2.

**Vickalectric Engineering Co., Ltd.**—Registered 3rd April. Capital £3,000. Electricians, electrical engineers and manufacturers of and dealers in all kinds of electrical machinery, etc. Directors: V. S. Lindon, Mrs. Dorothy M. Lindon, I. F. Lindon and Mrs. Nellie Lindon. Regd. office: Bodmin Road, Coventry.

**R. G. Evans & Sons, Ltd.**—Registered 2nd April. Capital £1,000. Manufacturers and distributors of, agents for and dealers in electrical goods of all kinds, radio and television receivers and accessories, etc. Directors: R. G. Evans and Florence M. Evans. Regd. office: Park Parade, 342, Crofton Road, Farnborough, Kent.

**R. Giddings & Co., Ltd.**—Registered 3rd April. Capital £100. Electrical engineers and contractors, etc. Directors: R. A. Giddings and Mrs. Violet C. M. Giddings. Regd. office: 150, Burrage Road, Woolwich, S.E.18.

**T. A. and P. W. Cleaver, Ltd.**—Registered 3rd April. Capital £1,000. Electrical contractors, etc. Directors: T. A. G. Cleaver and P. W. J. Cleaver. Regd. office: 26, Craven Street, London, W.C.2.

**Wyre Electrical Services, Ltd.**—Registered 8th April. Capital £500. Electrical engineers, general electrical and refrigeration installation contractors, manufacturers of and dealers in radio and television sets, etc. Directors: D. L. Merrall-Wyre and C. E. Skelton. Regd. office: 53, Bridge Road, Maidenhead, Berks.

**E. Whalley, Ltd.**—Registered 7th April. Capital £100. Wholesalers, importers, exporters, manufacturers of and dealers in dynamos, etc. Directors: E. Whalley and Joyce Whalley. Regd. office: Robinson's Hill, Bulwell, Nottingham.

**Norman Akers (Electrical), Ltd.**—Registered 7th April. Capital £500. Manufacturers and repairers of and dealers in dynamos, motors, armatures, etc. Directors: N. Akers and Maud Akers. Regd. office: 119, Queens Road West, Accrington.

**M. T. & B. Co., Ltd.**—Registered 6th April. Capital £1,000. Electricians, manufacturers of electronic measuring instruments, electrical contractors, television and radio engineers, etc. Directors: Mrs. Dora G. E. Burke, W. Todd and J. A. Mathews. Regd. office: 414, Bearwood Road, Smethwick, 41.

## Liquidations

**Electrocraft, Ltd.,** manufacturers of electrical goods, 39-41, New Broad Street, London, E.C.2.—Winding up voluntarily. Liquidator, Mr. D. F. Gay, 39-41, New Broad Street, London, E.C.2, appointed 6th April. Particulars of claims to the liquidator by 1st June.

**Morris & Smiles, Ltd.,** electrical contractors, 148-150, High Street West, Wallsend.—Winding up voluntarily. Liquidator, Mr. S. H. Reilly, 24, St. Mary's Place, Newcastle-on-Tyne, appointed 2nd April.

**Deakins (Electricians), Ltd.** (creditors' voluntary winding-up).—Meetings 18th May at 10, Ashfield Road, High Street, Cheadle, Ches., to receive an account of the winding-up by the liquidator, Mr. J. H. Lloyd.

**Evergreens (Leicester), Ltd.,** radio, television and electrical retailers, 29, Friar Lane, Leicester.—Winding up voluntarily. Liquidator, Mr. R. A. Haigh, Court Chambers, Friar Lane, Leicester, appointed 6th April. Particulars of claims to the liquidator by 30th May.

## Bankruptcies

**A. Armstrong,** 62, Lawson Street, Maryport, Cumberland, lately residing at 37, Senhouse Street, Maryport, electrical goods factor.—Receiving order made 14th April on a creditor's petition.

**A. C. Allport,** lately carrying on business at 2, Creek Road, March, Cambridgeshire, and at Outer Southgates, King's Lynn, Norfolk, under the style of Radio Repairs, for radio and electrical sales and repairs.—Trustee, Mr. C. A. Taylor, 41, Sidney Street, Cambridge, Official Receiver, released 13th April.

**R. Collier,** lately trading at 4, The Crescent, Littleham, Exmouth, and formerly trading in partnership with another under the style of Collier & Slater, at 4, The Crescent, Littleham, Exmouth, and 108, Victoria Road, Exmouth, refrigeration and electrical engineers.—Trustee, Mr. G. W. Sisman, 12, Pennsylvania Road, Exeter, Official Receiver, released 17th April.

**R. H. Ball,** 36, Whitefriars Road, Hastings, radio engineer, formerly residing at 12, The Parade, Leamington Spa, and carrying on business at Gordon Street, Leamington Spa, as a radio and electrical manufacturer.—Order made 13th March refusing discharge.

## G.E.C. of Ireland

The interests in Ireland of A.E.T. (Aibhleisi Eireannacha Teoranta), the Irish electrical manufacturing concern, have been merged with the General Electric Co., Ltd., in a new company to be known as the General Electric Co. of Ireland, Ltd. Mr. Leslie Gamage, chairman and managing director of the G.E.C., has become chairman of the Irish company. The present managing director of A.E.T., Mr. M. F. McCourt, will also be managing director of the new company. Other directors include Mr. W. Norton, T.D., Mr. H. D. McGough, former manager of the Irish branch of the G.E.C., and Mr. I. Williams, sales development manager of the G.E.C., England. The G.E.C. of Ireland will have its headquarters at Adelaide Road, Dublin, where a new building is under construction for administration, sales and warehousing. The new building will also have a showroom and demonstration theatre. New products to be added to the company's range of manufactures include fluorescent fittings, decorative lighting fittings, "Bakelite" accessories, hair dryers and refrigerators. It is expected that the existing staff of A.E.T., of more than 300, and the fifty Irish employees of G.E.C. (E), all of whom are being taken over by G.E.C. (I), will be more than doubled during the next two to three years. The Dunleer works of A.E.T. will be known as the A.E.T. Works of the General Electric Co. of Ireland, Ltd.

## New Mullard Laboratories

Two new laboratory blocks are being built on a site adjacent to the existing buildings of Mullard Research Laboratories at Salfords, near Redhill, Surrey. An additional 45,000 sq ft of floor space will be provided by the new buildings, which will consist of a three- and a four-storey block. This will house the electronics, telecommunications, transistor applications and television laboratories. It will also improve the facilities for the valve, semiconductor and materials research activities.

DOMESTIC ELECTRICAL EQUIPMENT

# REFRIGERATORS

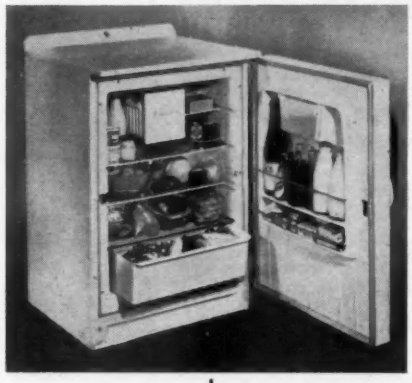
COMPARED with America (96 per cent) and Canada (85 per cent), the proportion of homes in this country possessing a refrigerator—estimated to be in the region of 13 per cent—is surprisingly small, but the number is steadily rising. Last year domestic sales reached an all-time record, 60 per cent higher than in 1957, with total sales amounting to about half a million. The recent Budget announcement of a reduction in purchase tax, from 30 to 25 per cent, although not as great as was expected in some quarters, will, no doubt, ensure that 1958 figures are maintained, if not exceeded.

As can be seen from the following survey, manufacturers have introduced several new models since last year, the accent being on the smaller types selling in the region of £50. Probably the outstanding feature of the new models is the greater use of interior fittings to make use of every inch of storage space, while keeping exterior dimensions to the minimum. This is achieved by such refinements as adjustable shelves, hinged half-shelves and flaps, and special compartments built into the door linings. The most popular models are the table top types in the medium-size range, but smaller (approximately 2 cu ft) refrigerators, suitable for wall mounting where kitchen space is at a premium, are gaining in popularity. Typical of these is the " Jackson 202 " 2 cu ft absorption type refrigerator, unusual in that the inner and outer case are of plastic, moulded in one complete piece. The G.E.C. has also introduced an absorption model (2½ cu ft) styled in the new " squared-up " fashion, while the latest addition to the Electrolux range is the L.26, a 2½ cu ft refrigerator capable of storing nine pint bottles.

The number of Continental refrigerators that are being imported into this country has noticeably increased during the past twelve months and we have included details of a few of these in this survey. The list is not intended to be comprehensive but is meant to be representative of the types and models which are now available.

| Manufacturer or Distributor | Model | Type | External Dimensions (height, width & depth in inches) | Capacity | Shelf Area | Ice Capacity | Salad Crisper | Frozen Food Chest |
|---|---|---|---|---|---|---|---|---|
| **ADA (HALIFAX), LTD.,** Johnson Street, Halifax. | " Ada " | Compressor | 36×24½×25 | 4·6 cu ft | 8 sq ft | 1¼ lb | No | Yes |
| **A.E.I.-HOTPOINT, LTD.,** 33, Grosvenor Place, London, S.W.1. | " Hotpoint " D.36 | Compressor | 36×21×21 | 3·6 cu ft | 6·9 sq ft | 20 cubes (1 tray) | No | Yes |
| | " Hotpoint " D.50 | Compressor | 36×24½×24 | 5 cu ft | 9·9 sq ft | 40 cubes (2 trays) | No | Yes |
| **COLDETTE REFRIGERATION,** 11, Dafforne Road, London, S.W.17. | " Coldette " | Absorption | 35×21×23 | 3 cu ft | 5·5 sq ft | 24 cubes | No | Yes (in ice box) |
| **EASICLENE PORCELAIN ENAMEL (1938), LTD.,** Lord Street, Wolverhampton, Staffs. | " Easiclene " 4200 | Compressor (sealed system) | 38×24×25 | 4·2 cu ft | 7·8 sq ft | 18 cubes (1 tray) | Yes | Freezer may be used |
| **EDMUNDSONS SUPPLY CORPORATION, LTD.,** 240-250, Ferndale Road, London, S.W.9. | " Frimatic " " Ile de France " 100 | Compressor | 33½×20½×21½ | 3·5 cu ft | 6·5 sq ft | 36 cubes (2 trays) | No | No |
| | " Frimatic " " Champagne " 120 | Compressor | 43½×20×21½ | 4·25 cu ft | 7·5 sq ft | 36 cubes (2 trays) | Yes | Yes |
| | " Frimatic " " Aquitaine " 150 | Compressor | 48½×22×22 | 5·25 cu ft | 10 sq ft | 36 cubes (2 trays) | Yes | Yes |
| | " Frimatic " " Armagnac " 190 | Compressor | 50×23×24 | 6·75 cu ft | 10·5 sq ft | 54 cubes (3 trays) | Yes | Yes |
| | " Frimatic " " Chatelaine " 260 | Compressor | 57½×25½×26 | 9·25 cu ft | 15·5 sq ft | 54 cubes (3 trays) | Yes | Yes |

1. *Easiclene model 4200 4·2 cu ft refrigerator*
2. *Ada 4·6 cu ft refrigerator*
3. *A.E.I.-Hotpoint model D.36*
4. *"Frimatic" "Aquitaine" 150 5·25 cu ft refrigerator (Edmundsons)*



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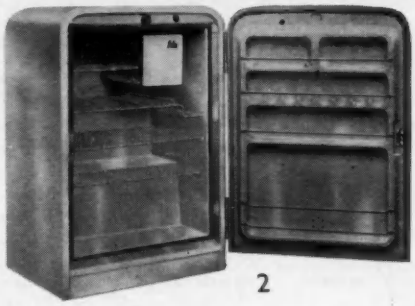

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| Interior Light | Special Features | Motor | Element Loading | Finish | Price (excl. tax) | Purchase Tax |
|---|---|---|---|---|---|---|
| Yes | Mounted on rubber rollers | ⅛ h.p. | — | White stoved enamel | £54 6 7 (plus £2 service fee) | £9 18 8 |
| No | On rollers for ease of movement, stainless steel freezer, inner door panel with egg rack, butter compartment with glass dish, commodity shelf, and bottle rack, guards on door shelves, ice tray, no-slam latch, and chiller dish | ⅛ h.p. | — | White or cream stoved enamel, table top in white, cream, blue, green or red vitreous enamel | £56 4 8 | £9 18 4 |
| Yes | On rollers for ease of movement, stainless steel freezer, 2 ice trays, inner door panel with egg rack, butter and cheese compartments, bottle rack, guards on door shelves, hinged half-shelf, no-slam latch, chiller tray, and large partially controlled humidity compartment | ⅛ h.p. | — | White or cream stoved enamel, table top in white, cream, blue, green or red vitreous enamel | £66 17 9 | £11 17 3 |
| No | Oak wooden cabinet | — | 150 W | Medium or light oak | £47 0 0 (plus £2 service fee) | £8 13 0 |
| Yes | Moulded polystyrene door panel with built-in butter conditioner and two large capacity shelves | ⅛ h.p. | — | Polystyrene moulded interior, stoved-enamel cabinet, porcelain-enamel "table-top." Various colours | £57 8 7 | £10 10 0 |
| Yes | All models: Fitted with exclusive "Double-Cold" refrigeration system, shelves of unbreakable "No-Oxyd" material, single piece polystyrene interiors | ⅛ h.p. | — | All models: Available in coral, green, ivory, red, hazel, yellow, white or black. Pink or white interiors | £55 0 7 | £10 1 5 |
| Yes | | ⅛ h.p. | — | | £59 9 3 | £10 17 9 |
| Yes | | ⅛ h.p. | — | | £66 11 4 | £12 3 8 |
| Yes | | ⅛ h.p. | — | | £82 11 0 | £15 2 0 |
| Yes | | ¼ h.p. | — | | £103 17 3 | £18 19 9 |

| Manufacturer or Distributor | Model | Type | External Dimensions (height, width & depth in inches) | Capacity | Shelf Area | Ice Capacity | Salad Crisper | Frozen Food Chest |
|---|---|---|---|---|---|---|---|---|
| ELECTRIX, LTD., Sterling Works, Dagenham, Essex. | "Sterling Electrix" 307 | Absorption | 31⅛ × 19¾ × 22½ | 2·3 cu ft | 4 sq ft | 24 cubes | No | No |
| ELECTROLUX, LTD., 153-5, Regent Street, London, W.1. | M.17 | Absorption | 31⅞ × 21 × 20¼ | 1⅞ cu ft | 3⅞ sq ft | 14 cubes (1 tray) | No | Yes |
| | M.27 | Absorption | 34⅜ × 22⅜ × 23⅜ | 2⅜ cu ft | 5⅜ sq ft | 14 cubes (1 tray) | No | Yes |
| | L.26 | Absorption | 32⅛ × 20⅜ × 23½ | 2⅛ cu ft | 5½ sq ft | 14 cubes (1 tray) | No | Yes |
| | L.37 | Absorption | 36½ × 21¾ × 23⅜ | 3⅜ cu ft | 7½ cu ft | 14 cubes (1 tray) | Yes | Yes |
| | L.500 | Absorption | 53½ × 26½ × 27½ | 5 cu ft | 9⅜ sq ft | 64 cubes (4 trays) | Yes | Yes |
| | L.76 | Absorption | 55½ × 30½ × 28⅝ | 7½ cu ft | 14¼ sq ft | 76 cubes (5 trays) | Yes | Yes |
| ELLIOTT DOMESTIC APPLIANCES, LTD., Victoria Road, Willesden, N.W.10. | Elliott 20 | Absorption | 23¾ × 19½ × 23½ | 2 cu ft | Not stated | 24 cubes | No | No |
| | Elliott 32 | Absorption | 36 × 22 × 23¾ | 3·2 cu ft | Not stated | 24 cubes | No | No |
| ENGLISH ELECTRIC CO., LTD., East Lancashire Road, Liverpool, 10. | 7503 | Compressor | 36 × 20 × 22½ | 3·6 cu ft | 6·7 sq ft | 1 lb | No | 0·3 cu ft U-evaporator |
| FRAIKAD, LTD., 139/141, Farringdon Road, London, E.C.1. | "Atlas" BA.75 | Absorption | 35⅛ × 21⅛ × 26½ | 2·7 cu ft | 4·5 sq ft | 18 cubes | No | Yes (4 lb) |
| FRIGIDAIRE DIVISION OF GENERAL MOTORS, LTD., Stag Lane, Kingsbury, London, N.W.9. | MZ-33T | Compressor | 36 × 21 1/16 × 21¼ | 3·3 cu ft | 6·7 sq ft | 18 cubes | No | Yes (7 lb) |
| | MZ-33A | Compressor | 35 × 21 1/16 × 21¼ | 3·3 cu ft | 6·7 sq ft | 18 cubes | No | Yes (7 lb) |
| | MZ-45T | Compressor | 36 × 24½ × 24⅛ | 4·4 cu ft | 8·9 sq ft | 18 cubes | No | Yes (10 lb) |

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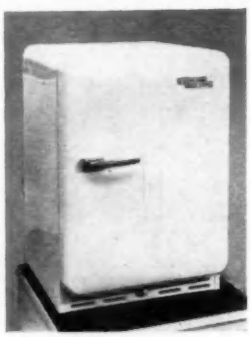
**5.** *Electrolux model L.26 2½ cu ft refrigerator*
**6.** *Electrix "Sterling Electrix" 2·3 cu ft absorption type refrigerator*
**7.** *Lightfoot model L.H.26 9·2 cu ft refrigerator*



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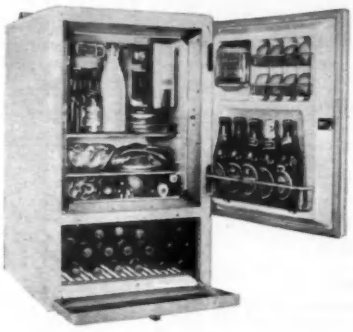
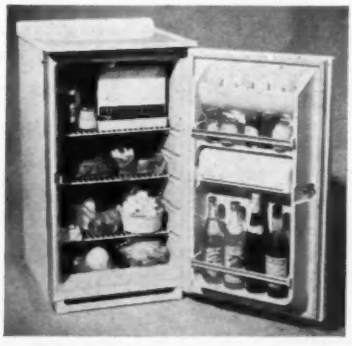
| Interior Light | Special Features | Motor | Element Loading | Finish | Price (excl. tax) | Purchase Tax |
|---|---|---|---|---|---|---|
| Yes | Plastic interior | — | 100 W | White stoved enamel | £40 0 0 | £7 6 3 |
| No | For building into kitchen fitments. 2 door shelves. Available with right or left hand door | — | 100 W | White or cream | £37 4 5 | £6 16 1 |
| No | For building into kitchen fitments. Butter and cheese compartments, egg rack and bottle shelf in door. Available with right or left hand door | — | 100 W | White or cream | £45 4 11 | £8 5 5 |
| No | 3 door shelves and egg rack. Flexible ice-cube releaser. Tray top available as an extra | — | 100 W | White or cream | £40 9 5 | £7 8 0 |
| No | 3 adjustable shelves and cheese and butter compartments in door. Flexible ice-cube releaser. Tray top available as an extra | — | 125 W | White or cream | £51 16 4 | £9 9 5 |
| Yes | 2 door shelves, flexible ice-cube releaser, 4 food containers | — | 300 W | White or cream | £81 14 9 | £14 18 10 |
| Yes | 4 shelves, cheese and butter compartment and egg shelf in door. 2 vegetable drawers, 4 food containers | — | 300 W | White or cream | £106 11 0 | £19 9 7 |
| No | 2 removable shelves, suitable for wall mounting | — | 100 W | White stoved enamel | £37 14 7 | £6 17 11 |
| No | 3 removable shelves, butter container and bottle and egg compartments in door | — | 125 W | White stoved enamel, pastel working top | £44 7 9 | £8 2 3 |
| No | Door storage for 4 full-size bottles, dairy keeper, jar shelf and egg nests, rod shelves | $\frac{1}{12}$ h.p. | — | Pale cream or white, blue interior | £53 7 9 | £9 15 3 |
| Yes | Egg holder, bottle shelf and butter keeper | — | 115 W | White stoved enamel, reversible plastic table top cover | £43 9 11 | £7 19 1 |
| No | 3 adjustable interior shelves, 2 door shelves and egg rack, left or right hand door opening, work table top | $\frac{1}{12}$ h.p. | — | Interior: High impact injection moulded polystyrene Exterior: Plastic based synthetic enamel. Five colours | £49 2 8 | £8 12 4 |
| No | As above, but without work table top | $\frac{1}{12}$ h.p. | — | As above | £48 4 10 | £8 9 2 |
| No | 3 adjustable interior shelves, 2 door shelves and egg rack. Left or right hand door opening, work table top | $\frac{1}{12}$ h.p. | — | Interior: Acid resistant porcelain on steel. Exterior: Plastic based synthetic enamel. Colours: Snowy White or Cotswold Cream only | £58 0 2 | £10 4 10 |



8

**8.** *Fraikad "Atlas" BA.75 2·7 cu ft refrigerator*
**9.** *English Electric model 7503 3·6 cu ft refrigerator*
**10.** *Frigidaire model DZ-45 4·4 cu ft refrigerator*



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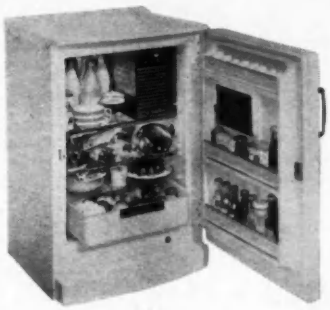

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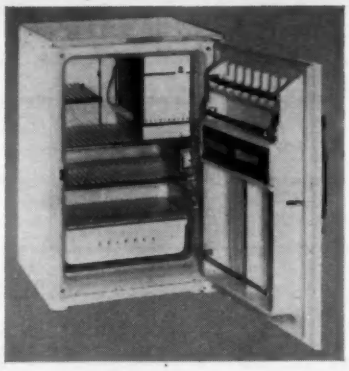

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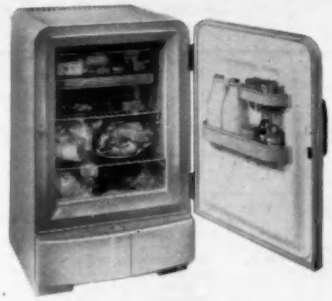
| Manufacturer or Distributor | Model | Type | External Dimensions (height, width & depth in inches) | Capacity | Shelf Area | Ice Capacity | Salad Crisper | Frozen Food Chest |
|---|---|---|---|---|---|---|---|---|
| **FRIGIDAIRE DIVISION OF GENERAL MOTORS, LTD.,** Stag Lane, Kingsbury, London, N.W.9. | MZ-45A | Compressor | 35 × 24½ × 24⅜ | 4·4 cu ft | 8·9 sq ft | 18 cubes | No | Yes (10 lb) |
| | DZ-45T | Compressor | 36 × 24½ × 24⅜ | 4·4 cu ft | 9 sq ft | 36 cubelets | Yes | Yes (10 lb) |
| | DZ-45A | Compressor | 35 × 24½ × 24⅜ | 4·4 cu ft | 9 sq ft | 36 cubelets | Yes | Yes (10 lb) |
| | MZ-84 | Compressor | 54½ × 27½ × 27½ | 8·4 cu ft | 15·8 sq ft | 14 cubes 36 cubelets (2 trays) | Yes | Yes (19½ lb) |
| | DZ-84 | Compressor | 54½ × 27½ × 27½ | 8·4 cu ft | 16 sq ft | 14 cubes 36 cubelets (2 trays) | Yes | Yes (46½ lb) (super-freeze chest) |
| | MZ-101 | Compressor | 62½ × 27½ × 27½ | 10·1 cu ft | 19·1 sq ft | 14 cubes 36 cubelets (2 trays) | Yes | Yes (27 lb) |
| | DZ-101 | Compressor | 62½ × 27½ × 27½ | 10·1 cu ft | 18·3 sq ft | 14 cubes 36 cubelets (2 trays) | Yes | Yes (46½ lb) (super-freeze chest) |
| **GENERAL ELECTRIC CO., LTD.,** Magnet House, Kingsway, W.C.2. | DE.250 | Absorption | 32⅜ × 21½ × 24½ | 2·6 cu ft | 5·5 sq ft | 1 lb (1 tray) | No | Yes |
| | DE.42A | Compressor | 36 × 23 × 25½ | 4·1 cu ft | 7·3 sq ft | 1·4 lb (1 tray) | No | Yes |
| | DE.61 | Compressor | 51 × 25½ × 26½ | 6·1 cu ft | 12·5 sq ft | 2·8 lb (2 trays) | Yes | Yes |
| | DE.82 | Compressor | 55½ × 28 × 28½ | 8·1 cu ft | 15·7 sq ft | 2·8 lb (2 trays) | Yes (two) | Yes |
| **KELVINATOR, LTD.,** Great West Road, London, W.4. | K46JT | Compressor | 35 × 22⅞ × 23½ | 4·6 cu ft | 7⅛ sq ft | 1 tray | Yes | Yes |
| | K51J | Compressor | 39½ × 22⅞ × 24½ | 5·1 cu ft | 8½ sq ft | 2 trays | Yes | Yes |
| | K68J | Compressor | 49 × 22⅞ × 24½ | 6·8 cu ft | 10⅝ sq ft | 2 trays | Yes | Yes |
| | K91J | Compressor | 53½ × 24½ × 26½ | 9·1 cu ft | 14 sq ft | 2 trays | Yes | Yes |
| | K91JD | Compressor | 53½ × 24½ × 26½ | 9·1 cu ft | 14 sq ft | 2 trays | Yes | Yes |



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11. *Main model 36C 3·6 cu ft absorption type refrigerator*
12. *G.E.C. model DE.250 2·6 cu ft absorption type refrigerator*
13. *Kelvinator model K46JT 4·6 cu ft refrigerator*
14. *Morphy-Richards 2·3 cu ft "Astral" console model*
15. *G.E.C. model DE.42A 4·1 cu ft refrigerator*

| Interior Light | Special Features | Motor | Element Loading | Finish | Price (excl. tax) | Purchase Tax |
|---|---|---|---|---|---|---|
| No | As MZ-45T, but without work table top | $\frac{1}{12}$ h.p. | — | As MZ-45T | £56 4 8 | £9 18 4 |
| Yes | 3 adjustable interior shelves, 2 door shelves and egg rack. Left or right hand door opening, work table top | $\frac{1}{12}$ h.p. | — | Interior: Acid resistant porcelain on steel. Exterior: Plastic based synthetic enamel. Five colours | £64 4 5 | £11 7 7 |
| Yes | As above, but without work table top | $\frac{1}{12}$ h.p. | — | As above | £62 8 11 | £11 1 1 |
| Yes | Butter compartment, 2 egg racks and 2 door shelves. Full width hydrator and 5 adjustable interior shelves | $\frac{1}{8}$ h.p. | — | As above | £100 18 7 | £17 14 5 |
| Yes | 2 egg racks and butter compartment, 2 door shelves. Full width hydrator and 4 adjustable shelves. Freezer stores 46½ lb of frozen food for 6 month periods | $\frac{1}{8}$ h.p. | — | As above | £111 11 7 | £19 13 5 |
| Yes | Butter and cheese compartments, 2 egg racks and 2 door shelves. Full width hydrator and 6 adjustable interior shelves | $\frac{1}{8}$ h.p. | — | As above | £129 6 8 | £22 18 4 |
| Yes | Butter and cheese compartments, 2 egg racks and 2 door shelves. Full width hydrator and 5 adjustable interior shelves. Freezer stores 46½ lb of frozen food for 6 month periods | $\frac{1}{8}$ h.p. | — | As above | £140 17 6 | £25 0 6 |
| No | Plastic interior. Door racks removable for cleaning | — | 100 W | Gleaming white or honeysuckle | £40 18 0 | £7 9 6 |
| Yes | "Turnaround" top shelf, door racks, "Slide-o-matic" hinge | $\frac{1}{8}$ h.p. | — | Gleaming white or honeysuckle, choice of colours for handle insets | £59 17 4 (plus £2 service fee) | £10 18 11 |
| Yes | 2 bottle racks, egg rack, cheese and butter compartments in door panel | $\frac{1}{8}$ h.p. | — | Gleaming white or honeysuckle, choice of colours for handle insets | £84 17 7 (plus £2 10s service fee) | £15 10 4 |
| Yes | 2 bottle racks, 2 egg racks, cheese and butter compartments in door panel | $\frac{1}{8}$ h.p. | — | Gleaming white or honeysuckle, choice of colours for handle insets | £107 8 8 (plus £3 service fee) | £19 12 10 |
| Yes | "Warerite" table top. Dairy compartment, egg rack and bottle storage in door, door opens within external width of cabinet | $\frac{1}{8}$ h.p. | — | White or champagne ivory stoved enamel | £59 17 4 | £10 9 9 |
| Yes | Spacious freezer chest, egg rack, large dairy box with separate storage for cheese, bottle rack in door | $\frac{1}{8}$ h.p. | — | White or champagne ivory stoved enamel | £65 17 10 | £11 11 9 |
| Yes | Extensive freezer chest (20 lb), full width crisper, 2 egg racks, 2 bottle racks and full width dairy compartment in door | $\frac{1}{8}$ h.p. | — | White or champagne ivory stoved enamel | £85 8 5 | £14 11 4 |
| Yes | Extra low temperature freezer compartment for long storage of frozen food, spacious crisper and dairy box, 2 egg racks and 2 bottle racks in door, push-button de-frosting | $\frac{1}{8}$ h.p. | — | White or champagne ivory stoved enamel | £107 0 2 | £17 11 6 |
| Yes | Extra low temperature freezer compartment for long storage of frozen food, automatic de-frost in both storage and freezer compartment, full width frozen food chest and crisper, dairy compartment, 2 egg racks and 2 bottle racks in door | $\frac{1}{8}$ h.p. | — | White or champagne ivory stoved enamel | £115 14 6 | £19 1 3 |

| Manufacturer or Distributor | Model | Type | External Dimensions (height, width & depth in inches) | Capacity | Shelf Area | Ice Capacity | Salad Crisper | Frozen Food Chest |
|---|---|---|---|---|---|---|---|---|
| LEC REFRIGERATION, LTD., Bognor Regis. | "Coronet" | Compressor | 27⅛ × 21½ × 20½ (incl. handle) | 2 cu ft | 3·6 sq ft | 12 cubes | No | Yes |
| | "International" | Compressor | 44 × 23½ × 25½ (incl. handle) | 6 cu ft | 10·7 sq ft | 24 cubes | Yes | Yes |
| | "Continental" | Compressor | 57⅞ × 26½ × 27½ (incl. handle) | 8 cu ft | 14·5 sq ft | 24 cubes and multiple cocktail ice portions | Yes | Yes |
| | HF4 (Home freezer) | Compressor | 44 × 23½ × 25½ (incl. handle) | 4 cu ft | 8 sq ft | — | — | — |
| | CF25 (Home freezer) | Compressor | 41 × 38½ × 23½ (incl. handle) | 5·4 cu ft | — | — | — | — |
| THE LIGHTFOOT REFRIGERATION CO., LTD., Abbeydale Road, North Circular Road, Wembley, Middx. | L.H.16 | Compressor | 45⅝ × 23½ × 26⅝ | 5·6 cu ft | 11·3 sq ft | 60 cubes (2 trays) | Yes | Yes |
| | L.H.26 | Compressor | 54⅝ × 28 × 29¾ | 9·2 cu ft | 17·8 sq ft | 60 cubes (2 trays) | Yes (two) | Yes |
| R. & A. MAIN, LTD., (Electrical Division), 48, Grosvenor Gardens London, S.W.1. | Main "22" | Absorption | 36 × 21 × 21 | 2·2 cu ft | 5·4 sq ft | 20 cubes (2 trays) | No | Yes (2¼ lb) |
| | Main "36.C" | Absorption | 46¼ × 24½ × 24⅝ | 3·6 cu ft | 7·7 sq ft | 30 cubes (3 trays) | Yes | Yes (4 lb) |
| MERSEYSIDE ENGINEERING (REFRIGERATION), LTD., Corinthian Buildings, South Castle Street, Liverpool, 1. | "Everest" 250 | Absorption | 26½ × 21⅛ × 24⅛ | 2·5 cu ft | 5·2 sq ft | 24 cubes | No | No |
| | "Everest" B.180.N | Compressor | 50½ × 22 × 25½ | 6·5 cu ft | 11·3 sq ft | 48 cubes (2 trays) | Yes | Yes (23 lb) |
| | "Everest" B.180.LP | Compressor | 52½ × 22¾ × 25 | 7 cu ft | 13·9 sq ft | 48 cubes (2 trays) | Yes | Yes (25 lb) |
| MORPHY-RICHARDS, LTD., 50, Conduit Street, London, W.1. | "Astral Table" BM/E | Absorption | 26 × 20½ × 21½ | 1·5 cu ft | 3·1 sq ft | 1·1 lb | No | No |
| | "Astral Console" B.230A | Absorption | 36 × 22 × 21¼ | 2·3 cu ft | 4·7 sq ft | 1·6 lb | Yes | Yes |
| | "Astral Commodore" A.400A | Absorption | 41½ × 22½ × 24 | 4 cu ft | 8 sq ft | 1·6 lb | Yes | Yes |

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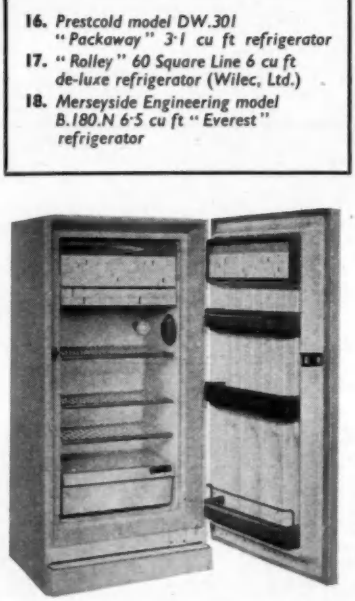
**16.** *Prestcold model DW.301 "Packaway" 3·1 cu ft refrigerator*
**17.** *"Rolley" 60 Square Line 6 cu ft de-luxe refrigerator (Wilec, Ltd.)*
**18.** *Merseyside Engineering model B.180.N 6·5 cu ft "Everest" refrigerator*



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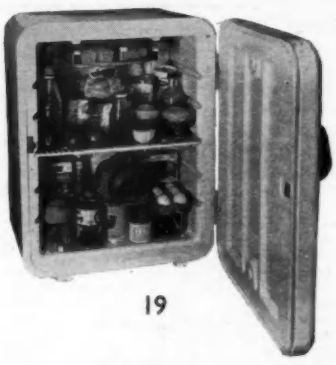
| Interior Light | Special Features | Motor | Element Loading | Finish | Price (excl. tax) | Purchase Tax |
|---|---|---|---|---|---|---|
| No | 2 adjustable shelves, stand available optional extra | ⅛ h.p. | — | White or cream stoved enamel | £32 15 0 (plus £2 service fee) | £6 3 9 |
| Yes | All plastic interior, adjustable shelves, door shelves and butter compartment | ⅛ h.p. | — | White or cream stoved enamel | £58 17 6 (plus £2 10s service fee) | £11 2 6 |
| Yes | Three door shelves, butter compartment and "Coolarder" | ⅛ h.p. | — | White or cream stoved enamel | £85 0 0 (plus £3 10s service fee) | £16 1 2 |
| — | — | ⅛ h.p. | — | White stoved enamel | £54 5 0 (plus £6 10s service fee) | £10 5 0 |
| — | Automatic alarm and locking handles available as optional extras | ⅛ h.p. | — | White stoved enamel | £85 0 0 (plus £4 service fee) | £16 1 2 |
| Yes | In-door racks, 4 shelves (2 sliding), plate-glass shelf | ⅛ h.p. | — | White stoved enamel | £71 11 1 (plus £2 10s service fee) | £13 10 4 |
| Yes | In-door racks, removable egg racks, plate-glass shelf | ⅛ h.p. | — | White stoved enamel | £113 0 0 (plus £4 service fee) | £21 6 11 |
| No | 3 adjustable shelves, cooler unit guaranteed for 5 years | — | 90 W | White or cream stoved enamel, red trim | £37 0 7 | £6 15 5 |
| No | Cooler unit guaranteed for 10 years. Unrefrigerated space for tinned foods | — | 180 W | White or cream stoved enamel | £52 1 7 | £9 10 5 |
| No | Suitable for wall mounting. Floor stand £2 11s 7d extra, plus 9s 5d tax | — | 100 W | White stoved enamel, plastic interior | £40 7 10 | £7 7 8 |
| Yes | 4-zone temperature principle, large butter and cheese compartments | ¼ h.p. | — | White or cream stoved enamel | £86 11 0 | £15 6 6 |
| Yes | 4-zone temperature principle, 3 built-in door compartments | ¼ h.p. | — | White or cream stoved enamel | £88 15 5 | £16 4 7 |
| No | Adjustable shelves | — | 95 W | White or cream stoved enamel | £30 0 7 | £5 12 0 |
| No | Adjustable shelves, 2 door racks, and fish or meat container | — | 120 W | White or cream stoved enamel | £37 15 0 | £7 0 10 |
| No | Adjustable shelves, 3 door racks, and fish or meat container | — | 120 W | White or cream stoved enamel | £46 6 8 | £8 12 10 |



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**19.** *Lec Refrigeration "Coronet" 2 cu ft refrigerator*
**20.** *AEG model 5810T 3·6 cu ft refrigerator (Welmec Corporation, Ltd.)*
**21.** *Jackson 202 2 cu ft absorption type refrigerator (Electrical Division of Radiation, Ltd.)*

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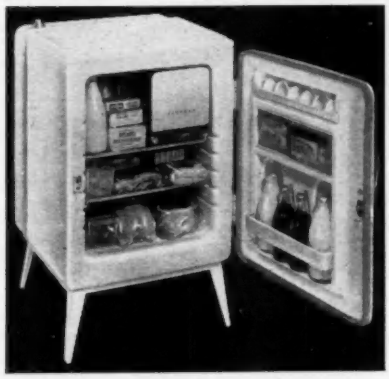

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| Manufacturer or Distributor | Model | Type | External Dimensions (height, width & depth in inches) | Capacity | Shelf Area | Ice Capacity | Salad Crisper | Frozen Food Chest |
|---|---|---|---|---|---|---|---|---|
| PRESTCOLD DIVISION, PRESSED STEEL CO., LTD., Cowley, Oxford. | "Packaway" D. or DW. 301 | Compressor | 33½ × 20⅝ × 18⅞ | 3·1 cu ft | 5·2 sq ft | 3½ lb | No | Yes |
| | "Big Four" D.431 | Compressor | 37½ × 22½ × 24½ | 4·3 cu ft | 7·8 sq ft | 3½ lb | No | Yes |
| | "Luxury Six" D.671 | Compressor | 47⅜ × 25½ × 25⅜ | 6·7 cu ft | 11·7 sq ft | 7½ lb | Yes | Yes |
| | "Automatic Nine" T.901 | Compressor | 56⅜ × 27⅛ × 27 | 9 cu ft | 12½ sq ft | 11¼ lb | Yes | Yes |
| RADIATION, LTD., Electrical Division, 255, North Circular Road, London, N.W.10. | Jackson 202 | Absorption | 27⅞ × 21½ × 21½ | 2 cu ft | 3·4 sq ft | 8 large 4 small cubes | No | No |
| WELMEC CORPORATION, LTD., 147, Strand, London, W.C.2. | AEG 5810T | Compressor | 33½ × 21½ × 24 | 3·6 cu ft | 7·5 sq ft | 24 cubes | Yes | Yes |
| | AEG 5914 | Compressor | 42⅜ × 23½ × 26 | 5 cu ft | 9·7 sq ft | 24 cubes (2 trays) | Yes | Yes |
| | AEG 5918 | Compressor | 45½ × 23½ × 28 | 6·35 cu ft | 12 sq ft | 24 cubes (2 trays) | Yes | Yes |
| WILEC, LTD., 90-96, City Road, London, E.C.1. | "Rolley" 475 | Compressor | 45 × 23 × 23 | 4·75 cu ft | 8½ sq ft | 24 cubes | Yes | Yes |
| | "Rolley" 60 | Compressor | 51 × 23 × 25 | 6 cu ft | 10½ sq ft | 24 cubes | Yes | Yes |
| | "Rolley" 75 | Compressor | 52⅜ × 23 × 27 | 7·5 cu ft | 14 sq ft | 24 cubes | Yes | Yes |
| | "Rolley" 60 (Square Line) | Compressor | 48 × 23 × 25½ | 6 cu ft | 10 sq ft | 24 cubes | Yes | Yes |

| Interior Light | Special Features | Motor | Element Loading | Finish | Price (excl. tax) | Purchase Tax |
|---|---|---|---|---|---|---|
| No | Special model for wall mounting or fitting in with kitchen units | ⅓ h.p. | — | White or cream synthetic enamel | £49 8 10 | £8 13 6 |
| Yes | "Prestalok" door lock, handy table-top with choice of 5 colours | ⅓ h.p. | — | White or cream synthetic enamel | £58 1 1 | £10 4 11 |
| Yes | Large shelf area with extra-roomy door shelves, "Prestalok" door lock | ⅓ h.p. | — | White or cream synthetic enamel | £84 18 6 | £14 19 6 |
| Yes | Automatic defrosting, "Prestalok" door lock, long-term frozen food storage | ½ h.p. | — | White or cream synthetic enamel | £122 19 11 | £21 15 1 |
| No | One-piece "Astralon" plastic cabinet. Floor stand and table top £2 7s 2d extra (4s 5d tax) | — | 85 W | White | £32 11 5 | £6 2 2 |
| Yes | Special drip tray for improved air circulation | ½ h.p. | — | White stoved enamel | £56 10 5 | £10 13 7 |
| Yes | As above | ½ h.p. | — | White stoved enamel | £72 8 5 | £13 13 7 |
| Yes | As above | ½ h.p. | — | White stoved enamel | £81 5 0 | £15 7 9 |
| Yes | Meat and fish chiller | ⅓ h.p. | — | White stoved enamel | £58 13 6 (plus £2 service fee) | £10 14 6 |
| Yes | Meat and fish chiller | ⅓ h.p. | — | White stoved enamel | £64 0 0 (plus £2 service fee) | £11 14 0 |
| Yes | Meat and fish chiller | ½ h.p. | — | White stoved enamel | £79 12 0 (plus £3 10s service fee) | £14 11 0 |
| Yes | Square line construction | ⅓ h.p. | — | White stoved enamel | £70 13 7 (plus £2 10s service fee) | £12 18 5 |

# NEXT WEEK'S EVENTS

*Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged.*

**MONDAY, 4th MAY**

**Birmingham.**—James Watt Memorial Institute, 6 p.m. I.E.E. South Midland Centre. "Some Problems Associated with the Operation of Large Turbo-Alternators," by A. Abbott.

**Bolton.**—Railway Hotel, Trinity Street, 7.45 p.m. A.S.E.E. Bolton Branch. "Practical Cable Jointing," by J. Kernaghan.

**Ilford.**—Angel Hotel, 8 p.m. A.S.E.E. North East London Branch. "The Electrical Industries Benevolent Association," by H. S. Fothergill.

**Leeds.**—Great Northern Hotel, 7.30 p.m. A.S.E.E. Leeds Branch. Travel films. Ladies' night.

**London.**—White Hall Hotel, Bloomsbury Square, 7.15 p.m. A.S.E.E. Central London Branch. Lecturettes.

Pepys House, 14, Rochester Row, Westminster, S.W.1. Junior Institution of Engineers. "Recent Developments in the field of Heavy Steel Forgings," by Paul Gaston Bastien.

**TUESDAY, 5th MAY**

**Belfast.**—Queen's University, Stranmillis Road, 6.30 p.m. I.E.E. Northern Ireland Centre. Annual general meeting.

**Edinburgh.**—Carlton Hotel, North Bridge, 7 p.m. I.E.E. South East Scotland Sub-Centre. Annual general meeting.

**Leeds.**—C.E.G.B., 6.30 p.m. I.E.E. North Midland Centre. Annual general meeting.

**London.**—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurement and Control Section. "Propagation of Electrical Signals along Nerve Fibres," by Professor A. L. Hodgkin.

Connaught Rooms, W.C.2, 2.45 p.m. Electrical Engineers' Exhibition. Exhibitors' meeting.

London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, 6.30 p.m. British Institution of Radio Engineers. "An Experimental Diode Parametric Amplifier and its Properties," by I. M. Ross, C. P. Lea-Wilson, A. J. Monk and A. F. H. Thomson.

**Manchester.**—Engineers' Club, 17, Albert Square, 6.15 p.m. I.E.E. North Western Centre. "Electrical Supplies to Power Station Auxiliaries," by D. A. Dewison, preceded by the annual general meeting.

**Tonbridge.**—Rose and Crown Hotel, 7.30 p.m. A.S.E.E. West Kent Branch. "Modern Practice in the Wiring of Buildings," by J. G. Jessell.

**WEDNESDAY, 6th MAY**

**Glasgow.**—39, Elmbank Crescent, 7 p.m. I.E.E. South West Scotland Sub-Centre. Annual general meeting.

**Halifax.**—Crown Hotel, 7.45 p.m. A.S.E.E. Halifax Branch. "Modern Cable Making Materials and Cables," by D. Pollard.

**London.**—Savoy Place, W.C.2, 6.30 p.m. I.E.E. London Graduate and Student Section. Annual general meeting followed by films.

Savoy Hotel, W.C.2, 12.30 for 1 p.m. British Electrical and Allied Industries Research Association. Annual luncheon.

Manson House, Portland Place, W.1, 5.30 p.m. Society of Instrument Technology, London Meeting. Annual general meeting and presentation of Bowen Prize, followed by presidential address.

**Manchester.**—Engineers' Club, Albert Square, 2 p.m. I.E.E. North Western Graduate and Student Section. Annual general meeting.

Engineers' Club, Albert Square, 7 p.m. A.S.E.E. Manchester Branch. "Computers and their Application in Industry."

Engineers' Club, Albert Square, 12.15 for 12.45 p.m. North Western Fuel Luncheon Club. "Fuel and its Uses," by W. C. Parker.

**Preston.**—North Western Electricity Board, Friargate, 7.15 p.m. I.E.E. North Lancashire Sub-Centre. Annual general meeting, followed by "Domestic High-Fidelity Reproduction," by J. Moir.

R.A.F.A. Club, East View, 7.30 p.m. A.S.E.E. Preston Branch. "Electric Clocks and Time Recorders," by E. O. Chapman.

**WEDNESDAY, 6th MAY and THURSDAY, 7th MAY**

**London.**—Church House, Westminster. Iron and Steel Institute. Annual general meeting.

**WEDNESDAY, 6th MAY to FRIDAY, 8th MAY**

**Harrogate.**—Old Swan Hotel. Institution of Plant Engineers. Annual conference.

**London.**—Waldorf Hotel, W.C.2. Institute of Materials Handling. First international conference.

**THURSDAY, 7th MAY**

**Cardiff.**—South Wales Electricity Board, The Hayes, 6 p.m. I.E.S. Cardiff Centre. Open forum on lighting.

**London.**—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Utilisation Section. "Lighting and Architecture," by J. M. Waldram.

**Nottingham.**—Electricity Service Centre, 6 p.m. I.E.S. Nottingham Centre. Annual general meeting.

**Torquay.**—Electric Hall, Union Street, 3 p.m. I.E.E. South Western Sub-Centre. "Electric Control of Stage and Television Lighting," by F. P. Bentham.

**FRIDAY, 8th MAY**

**Aberdeen.**—Robert Gordon's Technical College, 7.30 p.m. I.E.E. North Scotland Sub-Centre. Annual general meeting.

**Birmingham.**—New College of Technology, Gosta Green, 7 p.m. Institution of Electronics. "The Design of Transistor H.F. Amplifiers," by L. E. Jansson.

**Hanley.**—Grand Hotel, 7.30 p.m. A.S.E.E. Stoke and Crewe Branch. Open discussion on "The Current Edition of I.E.E. Regulations."

**London.**—Savoy Place, W.C.2, 6 p.m. I.E.E. Medical Electronics Discussion Group. Discussion on "Microwave Radiation Hazards," opened by Dr. D. H. Shinn and Dr. N. L. Lloyd.

**Stoke-on-Trent.**—Technical College, 7 p.m. I.E.E. North Staffordshire Sub-Centre. Annual general meeting, followed by "A Review of Work towards Nuclear Energy from Controlled Thermonuclear Reaction," by D. W. Fry.

**FRIDAY, 8th MAY to SUNDAY, 10th MAY**

**Folkestone.**—Hotel Metropole. Association of Supervising Electrical Engineers. Annual conference.

**Scarborough.**—National Industrial Safety Conference and Trade Exhibition.

**FRIDAY, 8th MAY to MONDAY, 11th MAY**

**South Cornwall.**—Carlyon Bay Hotel. I.E.E. Western Centre. Summer meeting.

**SATURDAY, 9th MAY**

**Bristol.**—I.E.E. Bristol Graduate and Student Section. 10 a.m. Visit to Berkeley power station.

**Leeds.**—C.E.G.B., 1, Whitehall Road, 2.30 p.m. I.E.E. North Midland Graduate and Student Section. Annual general meeting.

**Manchester.**—A.S.E.E. Manchester Branch. Fourth car rally.

**Nottingham.**—A.S.E.E. Nottingham Branch. Visit to a B.B.C. transmitting station.

## TRADE MARK APPLICATIONS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 15th May:—

**Incorporail.** No. 777,670. Class 7. Electric welding machines. **Incorporail.** No. 777,671. Class 9. Electric resistance welding apparatus (not machines).—C.S.B. Developments, Ltd., 85, Delhi Road, Bush Hill Park, Enfield, Middx.

**Gala.** No. 776,473. Class 9. Electrical apparatus and appliances for domestic use, and parts.—A.E.I.-Hotpoint, Ltd., 33, Grosvenor Place, London, S.W.1.

**Permaset.** No. 779,027. Class 9. Chokes and transformers.—Thorn Electrical Industries, Ltd., 105-109, Judd Street, London, W.C.1.

**BICC.** No. 783,640. Class 9. Wire, strands, strips, tapes, rods, tubes, bars, sections and braids, all made of common metal or of alloys thereof and being non-insulated goods for electrical purposes; electric resistance material in the form of metal wire, metal braid and metal strands; electrodes for electric welding apparatus; and electric safety fuses, cut-outs, connectors, apparatus for locating faults in electric cables, wave guides (electrical apparatus), electric current collecting devices for use with electric conductors in electric traction systems, and parts.—British Insulated Callender's Cables, Ltd., Norfolk House, Norfolk Street, London, W.C.2.

**Ransburg.** No. 780,577. Class 9. Electrical apparatus for use in the production of electrostatic fields for charging paint sprays, etc.—Henry W. Peabody (Industrial), Ltd., 17, Great Suffolk Street, London, S.E.1.

**Niometer.** No. 783,776. Class 9. Electrical measuring apparatus and instruments.—Newport Instruments (Scientific and Mobile), Ltd., Newport Pagnell, Bucks.

**Corrupoint.** No. 784,549. **Corrutrack.** No. 784,550. Class 9. Covered electric wire and electric cables. **Corru.** No. 784,972. Class 9. Covered electric wire and electric cables; connections, terminals, shunt boxes, junction boxes, conduits, switches and switchboards; electrical apparatus and instruments for use in controlling the operation of mechanical contrivances by electric current, voltage, frequency or phase; electric distribution apparatus, accumulators; electric discharge tubes (not for lighting purposes); electricity meters, electromagnetic coils for electromagnetic machines; electric indicating instruments, measuring apparatus; sound reproducing apparatus, etc.—Wandleside Cable Works, Ltd., 106, Garratt Lane, Wandsworth, London, S.W.18.

**Mapeline.** No. 785,066. Class 9. Anodes for cathodic protection.—Metal & Pipeline Endurance, Ltd., 22, Queen Anne's Gate, London, S.W.1.

**Tel Super Chef.** No. 775,866. Class 11. Electric cooking apparatus and installations.—Brattel Electric Co., Ltd., Arcade House, 27, Old Bond Street, London, W.1.

**Conga.** No. 784,762. **Carmen.** No. 784,763. Class 11. Heating apparatus, heating installations and parts.—Simplex Electric Co., Ltd., Broadwell, Oldbury, Birmingham.

**Belflex.** No. 775,941. Class 17. Electrical insulation materials made of coated textile piece goods or of flexible plastics in sheet form.—Belstaff Manufacturing Co., Ltd., 5, Caroline Street, Longton, Stoke-on-Trent.

# CONTRACT INFORMATION

## Accepted Tenders and Prospective Electrical Work

### CONTRACTS OPEN

*Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses*

**Australia.**—State Electricity Commission of Victoria, Melbourne. 27th May. Coal handling plant for Yallourn "E" power station. (E.S.B. 9260/59. Ten/38624.)*

State Electricity Commission of Western Australia, Perth. 4th June. 3,000 V switchgear. (E.S.B. 9352/59. Ten/38593.)* Also 440 V switchgear. (E.S.B. 9351/59. Ten/38598.)*

Secretary, Victorian Railways, Melbourne. 24th June. Radio telephone equipment. (E.S.B. 9239/59. Ten/38580.)*

**Bradford.**—Corporation Waterworks Committee. 23rd May. Three electrically driven centrifugal pump sets for Heaton pumping station. Waterworks engineer, 50, Darley Street.

**Ceylon.**—Posts and Telecommunications Department, Colombo. 30th June. Trunk cable. (E.S.B. 9203/59. Ten/38577.)*

**India.**—Madras State Electricity Board. 5th June. Conductors and accessories for 110 kV transmission lines. (E.S.B. 9195/59. Ten/38563.)* 11th June. Insulators and accessories for 110 kV transmission lines. (E.S.B. 9196/59. Ten/38572.)* Steel earth cables and accessories. (E.S.B. 9194/59. Ten/38564.)*

**Lebanon.**—Office National Du Litani, Beirut. 5th May. Telephone, radio telephone and telegraph equipment. (E.S.B. 9871/59. Ten/38680.)*

**Malaya.**—Central Electricity Board. 18th September. Supply and erection of 132 kV transmission lines. (See this issue.)

**New Zealand.**—New Zealand Electricity Department, Wellington. 16th June. Four 6,667 kVA transformers. (E.S.B. 9242/59. Ten/38578.)*

**Pakistan.**—Pakistan Industrial Development Corporation 10th June. Equipment, including circuit-breakers, transformers, isolators, earthing systems, insulators, conductors and earth wire for Sargodha grid station. (E.S.B. 8699/59/I.C.A. Ten/38630.)*

**Rhodesia and Nyasaland.**—Town Clerk, Umtali. 6th May. Insulated cable and compound. (E.S.B. 9754/59. Ten/38690.)* E.h.v. armoured cable. (E.S.B. 9753/59. Ten/38695.)* 13th May. One 750 kW petrol driven generator. (E.S.B. 9757/59. Ten/38699.)*

**Rowley Regis.**—Borough Council. 11th May. Street lighting equipment. S. G. Wood, borough engineer, Municipal Buildings, Old Hill, Staffs.

**Southgate.**—Borough Council. 14th May. Dust extraction plant at refuse disposal depot. G. H. Taylor, town clerk, Town Hall, Palmers Green, N.13.

**Tangier.**—Directeur-General de la Telefonica de Tanger S.A. 15th May. Telephone cable. (E.S.B. 9165/59. Ten/38594.)*

**Wrexham.**—Corporation. 18th May. Electrical installations in 133 dwellings. (See this issue.)

### ORDERS PLACED

**London.**—L.C.C. Renewal and improvement of the electrical installation at Coverdale County Primary School, Hammersmith (£3,891).—Buchanan & Curwen. Electrical installations in blocks 1-6, New Park Road site, Wandsworth (£6,703).—Powis Electrical Co. Installation of passenger lifts at the new county secondary school, North Wharf Road, Paddington (£10,130).—Elliston, Evans & Jackson (London). Rivers and Drainage Committee. Switchboards and transformers at the Southern Outfall (£44,579).—Johnson & Phillips. Electrically operated disc valves (£9,669).—Boving & Co.

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

### WORK IN PROSPECT

*Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors*

**Ashington.**—Eight-storey blocks of flats for old people; U.D.C. surveyor.

**Aylesford.**—Hall (£45,000); Norman West, builder, Commercial Road, Strood, Kent.

**Barrow-in-Furness.**—Works, Park Road; Zenith Carburetter Co., Ltd., Honeypot Lane, Stanmore.

**Basingstoke.**—Offices, Cross Street and Church Lane; Wallis & Smith, architects, 6a, London Road.

**Bedfordshire.**—Central health clinic, Bedford (£30,000); S. Goodman, county architect, Shire Hall, Bedford.

**Bedlington.**—Shopping centre (19 shops and seven flats), Guide Post; J. Dodds and Son, builders, Dark Lane, Morpeth.

**Birmingham.** — Research laboratories, Department of Anatomy of University; Wm. Sapcote & Sons, Ltd., 67, Camden Street.

**Blackburn.**—Hostels at Shadsworth and Feniscliffe; borough surveyor, Town Hall.

**Dudley.**—Central clinic, Firs Street (£52,000) and houses at Maple Green, Old Park Farm (72), and St. Giles Street, Netherton (63); borough architect, 5, Ednam Road.

**Eston.**—Swimming baths at South Bank (£154,000); Charles Tennet (Builders), Ltd., contractors, Church Road, Stockton-on-Tees.

**Exeter.**—Rebuilding of City Library; H. B. Rowe, city architect, Municipal Offices.

**Gateshead.**—Headquarters offices, Team Valley trading estate, for Durham Coal Board (£400,000); Leslie & Co., contractors, Woodland Road, Darlington.

**Haywards Heath.**—Nurses' training school, St. Francis Hospital; Stanley Roth, Tetley & Felce, architects, 60, West Street, Brighton.

**Hereford.**—Houses (156), Green Lane site; housing architect, Town Hall.

**Hinckley.**—Central omnibus station, Lancaster Road; engineer and surveyor, Argent House, St. Mary's Road.

**Leamington Spa.**—Church hall, Cubbington Road; Trepess, Harley-Smith & Steele, architects, 1, Church Street, Warwick.

**Leeds.**—Four-storey block of showrooms and offices, Vicar Lane; H. Lane Fox, architect, 25, Bond Street.

**Leicester.**—Demolition and rebuilding of Mellor Infants' and Junior Schools; city architect.

**Letchworth.**—Factory for International Computer & Tabulating Co.; Taylor Woodrow Construction, Ltd., Ruislip Road, Southall.

**London.**—Works extensions (£60,000); Chiswick Products, Ltd., Burlington Lane, W.4.

Shop and showrooms, 23/25, Ealing Broadway; F. G. Minter, Ltd., builders, 4, Buckingham Gate, S.W.1.

Office block, Brompton Road, Westminster; Myton, Ltd., Western House, Western Avenue, W.5.

**Middlesbrough.**—Houses (30) on Easterside estate; Athey & Sons, Ltd., builders, Windsor Road.

Additions to College of Art (£12,500); Skeen, Ltd., builders, George Street, Thornaby-on-Tees.

**Milford Haven.**—Pumping station; Ward, Ashcroft & Parkman, consulting engineers, 38, The Temple, Dale Street, Liverpool.

**Morley.**—Houses (80), Moorhead estate; borough surveyor, Town Hall.

**North Shields.**—Factory premises at Percy Main for Brown-Hodges, Ltd., engineers, 25, Trafalgar Street, Newcastle-on-Tyne.

**Norwich.**—Houses (99) and nine shops, Alderson Street/Hall Road clearance area, and houses (132), Vauxhall Street redevelopment area; D. Percival, city architect.

**Nottingham.**—Casualty department and ward for Eye Hospital; Evans, Cartwright & Wollatt, architects, 6, Clarendon Street.

**Oxford.**—Exensions (£50,000) for Department of Education, Norham Gardens; University surveyor, 5, South Parks Road.

**Pontypool.**—Secondary modern school, Trevethin; Richards & Trollope, architects, 14, Sackville Street, London, W.1.

**Poole.**—Houses (76), Torlin Moor, Hamworthy; borough surveyor, Municipal Buildings.

**Portsmouth.**—Extensions to Teachers' Training College, Locksway Road, Milton; E. Wingfield-Bowles & Partners, consulting engineers, 32, Old Queen Street, London, S.W.1.

**Rochdale.**—Houses (44), Freehold clearance area; borough surveyor, Town Hall.

**Rotherham.**—Erection of Kirk House hostel, Browning Road (£39,460); borough surveyor, Municipal Offices.

**Scarborough.**—Additions to Scarborough Girls' High School (£22,000); E. Hunter, Ltd., builders, Beaconsfield Street.

**Southampton.**—Central waterworks depot; L. G. Mouchel & Partners, consulting engineers, 36/38, Victoria Street, London, S.W.1.

Old people's flats and houses (30), Brownhill House, and six blocks of four-storey flats, Thornhill; borough engineer, Civic Centre.

**Sunderland.**—Additional 23 bedrooms at Roker Hotel for J. W. Cameron & Co.; Snowdon Brothers, builders, Handel Street.

Infants' school, Grindon Village (£65,000); Tate & Holmes, Ltd., builders, Benwell, Newcastle-on-Tyne.

Additions to Havelock Junior School (£20,000); borough architect, Grange House, Stockton Road.

**Swindon.**—Methodist church, Queen's Drive, South Park; Pope Bros., Cricklade Street.

**Wakefield.**—Houses (104) and flats (40), Parkhill estate, Eastmoor; city engineer, Town Hall.

**Wallsend.**—Dwellings (67), Perth Gardens; J. H. James & Son, builders, Archer Street, Wallsend.

**Walsall.**—Swimming bath, administrative offices, etc., as further phase of bathing establishment; M. E. Habershon, borough engineer, Town Hall.

**West Hartlepool.**—Combined hall, clinic and branch library, Owton Manor estate; A. G. Sinclair, borough architect.

**West Lancs.**—Bungalows (58); surveyor, 52, Derby Street, Ormskirk.

**Whitley Bay.**—Houses (38), Millfield estate, Seaton Sluice; Robertson, Ltd., builders, East Park View, Blyth.

**Wigan.**—Multi-storey flats and maisonnettes, Douglas Street and Lime Street sites; Allan Royle, town clerk, Municipal Buildings.